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EXERCISE DESERT ROCK LAS VEGAS NV  
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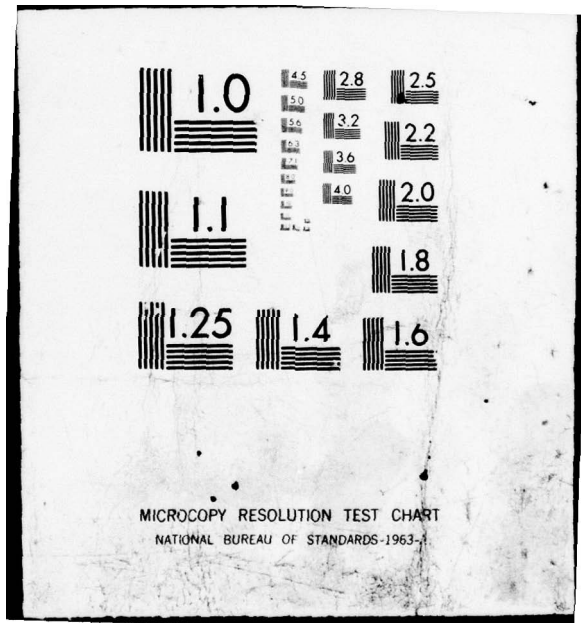
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DTIC ACCESSION NUMBER



LEVEL



INVENTORY

Exercise Desert Rock I

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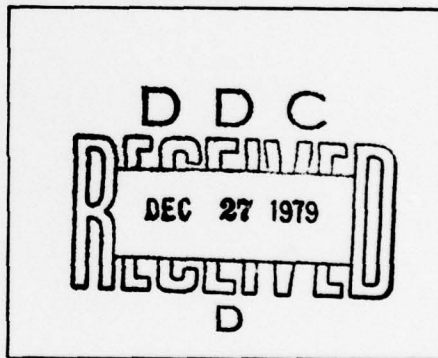
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# EXERCISE

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# DESERT ROCK I

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DTIC 141  
141 100741

Classification (Cancelled) (Changed to)  
By Authority DAMO-SSN  
By Norman J. Falls Date 9/26/78

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ATOMIC ENERGY ACT 1946



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

REPLY TO  
ATTENTION OF:

DAMO-SSN

3 FEB 1978

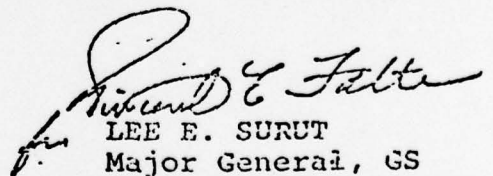
SUBJECT: Review for Declassification of Department of Army  
and Marine Corps Reports Concerning Desert Rock  
Operations

Director  
Defense Nuclear Agency  
Washington, DC 20305

1. Reference your memorandum dated 1 February 1978, subject as above. Department of the Army has no objection to the declassification of the reports listed in the inclosure.
2. A sanitized version of the document "Report of Test Exercise Desert Rock II and III" (item number 2 on inclosure) has been prepared in accordance with the comments provided in your referenced memorandum.
3. This office has taken final declassification action on items 1, 2, 3, 4, 5, 6, 9, 14, 15, and 20, copies of which are in our possession.

FOR THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS:

1 Incl  
as

  
LEE E. SURUT  
Major General, GS  
Director of Strategy,  
Plans, and Policy

VINCENT E. FALTER  
Brigadier General, GS  
Deputy Director of Strategy,  
Plans, and Policy



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REPORT OF EXERCISE DESERT ROCK I  
DISTRIBUTION LIST

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a. Zone of Interior

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Jt Air Def Bd (2), Jt Amphib Bd (2), Jt Tac Air Sup Bd (2).

3. Navy (23)

4. Air Force (44)

5. AEC (5)

6. AFSWP (15)

7. MLC (2)

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**FORWARD**

Exercise DESERT ROCK I marked the first time that tactical troops have had the opportunity to receive realistic training in the tactical aspects of atomic warfare. The Exercise was highly successful and it is intended that similar exercises will be held in the future whenever the opportunity arises.

The Maneuver Director's Report of Exercise DESERT ROCK I has been reproduced and distributed herewith for the information of all concerned. It is emphasized that the information contained herein is based upon a very limited number of observations and should not be interpreted as final or conclusive. The report has been reproduced as submitted by the Maneuver Director and does not necessarily represent Department of the Army policy or doctrine.

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HEADQUARTERS III CORPS  
Fort MacArthur, California

INTRODUCTION

Exercise Desert Rock I is completed.

Approximately 3000 observers, 2500 supporting service troops, and a battalion combat team of the 11th Airborne Division have had an opportunity to be indoctrinated in the use and effects of atomic weapons. The observers and the Battalion Combat Team participated in the employment of an atomic weapon tactically on a simulated battlefield.

The purpose of Exercise Desert Rock I was to test current doctrines to the extent afforded, to determine the effect of an atomic weapon on our equipment and materiel, to indoctrinate personnel, test their psychological reaction during the tactical employment of the weapon, and to the degree possible, determine what physical protective measures can be taken against the weapon.

The Exercise was successful, and the mission assigned was accomplished. It is realized that no major change in doctrine can be developed from one test, but much valuable information has been obtained which, if correlated with data from other exercises, will furnish us with definite facts upon which to proceed.

The availability of atomic weapons for tactical use is increasing. It now remains for us to perfect as rapidly as possible the doctrines and techniques governing the employment of these weapons by our forces and the measures which we will take against these weapons when utilized by the enemy.

I look forward to further tests of this nature which will enable us to test more of the effects on personnel, and military equipment, and to further test our formations and doctrines as they are applied to the tactical use of atomic weapons.

*W. B. Kean*  
W. B. KEAN  
Major General, U. S. Army  
Commanding

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ATOMIC ENERGY ACT 1946

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AMCDC-GCT

18 September 1951

SUBJECT: Outline Plan-Operation Desert Rock

TO: Commanding General, Army Field Forces  
Fort Monroe, Virginia

THRU: Commanding General  
Sixth Army  
Presidio of San Francisco, California

1. GENERAL.

a. A Battalion Combat Team training exercise will be conducted in the vicinity of Indian Springs, Nevada, during the latter part of October 1951.

b. The exercise will be conducted under the supervision of the Commanding General, Sixth Army; Commanding General III Corps, has been designated as exercise director.

c. The exercise will be known and referred to by the unclassified code name "Desert Rock."

2. AUTHORITY.

TRX OCAFF ATNG-43, OCAFF dated 052203Z Sept 51.

3. OBJECTIVES OF EXERCISE.

a. To provide indoctrination training in the tactical employment of atomic weapons and essential physical protection measures, to test special equipment.

b. To indoctrinate designated military personnel.

c. To determine the psychological reaction of troops watching an explosion and passing through the area of explosion as soon after the burst as possible.

d. To determine insofar as possible the effects of the explosion on as many types of ground forces equipment at varying distances

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AMCDC-GCT

SUBJECT: Outline Plan-Operation Desert Rock

from the ground zero; and, through the use of animals, the probable effects on personnel.

e. To determine the effectiveness of various tactical formations, offensive and defensive, and of emplacements.

4. EXERCISE PHASES.

a. Movement of designated troops to maneuver area (Annex 1 and 2): service units - 13 Sep to 9 Oct 51; tactical units - 14 Oct to 20 Oct.

b. Orientation of all personnel entering maneuver area: Service units - 15 Sep to 9 Oct 51; tactical units and observers - 20 Sep to 25 Oct 51.

c. Preparation and rehearsal of tactical exercise (Annex 3 and 4): 20 Sep to 26 Oct 51.

d. Exercise to include critique. D Day - H Hour to be announced.

e. Movement of troops to home station and closing of maneuver area: tactical units - 29 Oct to 31 Oct. Service units - 1 Nov to 10 Nov.

/s/ W. B. Kean  
/t/ W. B. KEAN  
Major General, U. S. Army  
Commanding

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ATOMIC ENERGY ACT 1954

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Hq III Corps  
Cp Roberts, Calif  
18 Sep 1951

ANNEX NO. 1 TO OUTLINE PLAN OPEATION DESERT ROCK

SERVICE TROOP LIST

UNIT	HOME STATION	ETA	REMARKS
Hq III Corps	Cp Roberts	20 Sep 51	AMGCT-P 0979 7 Sep 51
Hq Co III Corps	Cp Roberts	20 Sep 51	AMGCT-P 0979 7 Sep 51
Hq III Corps Arty	Ft Lewis	12 Sep 51	
Hq Btry III Corps	Ft Lewis	12 Sep 51	Movement 0 Hq III Corps 10 Sep 51
<u>AG</u>			
806th APU (Type F)	Ft Lewis	14 Sep 51	AMGCT-P 0979 7 Sep 51
<u>ENGR</u>			
231st Engr C Bn	Ft Lewis	14 Sep 51	AMGCT-P 0979 7 Sep 51
359th Engr Util Det	Cp Cooke	15 Sep 51	AMGCT-P 0979 7 Sep 51
90th Engr Water Sup Co	Ft Lewis	14 Sep 51	AMGCT-P 0979 7 Sep 51

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ANNEX NO. 1 (cont'd)

UNIT	HOME STATION	ETA	REMARKS
<u>ENGR</u> (cont'd)			
Det 597th Engr Lt Equip Co	Ft Huachuca	14 Sep 51	VOCG 6A
Maint Plat 705 Engr Field Maint Co	Ft Huachuca	22 Sep 51	AMGCT-P 0979 7 Sep 51
<u>MED</u>			
374th Convalescent Center (-)	Ft Lewis	15 Oct 51	AMGCT-P 0980 7 Sep 51
Det "B" 374th Convalescent Center	Ft Lewis	14 Sep 51	AMGCT-P 0980 7 Sep 51
94th Vet Food Inspection Det (Type JA)	Ft Lewis	14 Sep 51	AMGCT-P 0980 7 Sep 51
Det "A" 374th Convalescent Center	Ft Lewis	14 Sep 51	AMGCT-P 0980 7 Sep 51
<u>MP</u>			
One (1) Co, 505th MP Bn	Cp Roberts	9 Oct 51	AMGCT-P 0980 7 Sep 51
Co A, 505th MP Bn (-)	Cp Roberts	15 Sep 51	AMGCT-P 09135 11 Sep 51
Plat Co A, 505th MP Bn	Cp Roberts	13 Sep 51	AMGCT-P 09135 11 Sep 51
Plat Co A, 505th MP Bn	Cp Roberts	20 Sep 51	AMGCT-P 09135 11 Sep 51

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ANNEX NO. 1 (cont'd)

UNIT	HOME STATION	ETA	REMARKS
<u>ORD</u>			
393d Ord Bn	Cp Cooke	17 Sep 51	AMGCT-P 0979 7 Sep 51
161st Ord Depot Co (-)	Cp Cooke	17 Sep 51	AMGCT-P 0979 7 Sep 51
3623d Ord Co MM	Cp Cooke	17 Sep 51	AMGCT-P 0979 7 Sep 51
<u>QM</u>			
Det, 53d QM Base Dep Hq/Hq Co	Utah Gen Depot	20 Sep 51	AMGCT-P 9146 12 Sep 51
1st Plat 523d QM Sub Dep Co (-)	Utah Gen Depot	20 Sep 51	VOCG 6A
539th QM Lndry Co (SM)	Ft Lewis	14 Sep 51	AMGCT-P 0979 7 Sep 51
621st QM Sv Co	Ft Lewis	20 Sep 51	AMGCT-P 0912 11 Sep 51
<u>SIG</u>			
Det Hq & Hq Co, 303 Sig Svc Bn (plus)	Cp Cooke	16 Sep 51	AMGCT-P 0979 7 Sep 51 AMGCT-P 09135 11 Sep 51
Det Hq & Hq Co and Co "B" 314th Sig Con Bn	Cp Cooke	16 Sep 51	AMGCT-P 09135 11 Sep 51
Det 504th Sig Base Maint Co	Sacramento	20 Sep 51	VOCG 6A

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ANNEX NO. 1 (cont'd)

UNIT	HOME STATION	ETA	REMARKS
<u>TRANS</u>			
4th Trans Trk Co	Cp Stoneman	14 Sep 51	AMGCT-P 0979 7 Sep 51
92d Trans Car Co	Cp Roberts	20 Sep 51	AMGCT-P 0979 7 Sep 51
562d Trans Staging Area Co	Cp Stoneman	15 Oct 51	AMGCT-P 0980 7 Sep 51

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Hq III Corps  
Cp Roberts, Calif  
18 Sep 1951

ANNEX NO. 2 TO OUTLINE PLAN OPERATION DESERT ROCK

TACTICAL TROOP LIST

UNIT	HOME STATION	ETA	REMARKS
One (1) Bn 11th Airborne	Cp Campbell	20 Oct 51	Not yet alerted
C Btry, 546th FA Bn (155)	Ft Lewis	20 Oct 51	Not yet alerted
Plt Engrs 11th Airborne Div	Cp Campbell	20 Oct 51	Not yet alerted
One (1) Med Det, 11th Airborne Div	Cp Campbell	20 Oct 51	Not yet alerted

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Hq III Corps  
Cp Roberts, Calif  
14 September 1951

ANNEX 3 TO OUTLINE PLAN OPERATION DESERT ROCK

TACTICAL SITUATION - OPERATION DESERT ROCK

MAPS: Scale 1:125,000; Sheet: Nevada; Wheelbarrow Peak Quadrangle N3700-W116001-30; Emigrant Valley Quadrangle N3700-W11530/30; Skull Mountain N3630-W11600/30; Indian Springs N3630-W11t30/30; Sixth Army Area 3100-710400/1800 X 2100.

1. GENERAL SITUATION

a. Enemy:

(1) During the period 1 - 30 August 1951 a strong Aggressor force, estimated as two (2) armies, consisting of four (4) corps each, landed on the Northwest Coast of the United States and proceeded to drive to the Southeast with the apparent intent of driving the U.S. Armies to the Southeast.

(2) Available information indicates that each Corps contains three (3) Infantry and one Armored division. By 25 October 1951, the Aggressor force has reached a line: San Luis Obispo, Calif - Visalia, Calif - Battey, Nevada, Caliente, Nevada, where it is being delayed by friendly forces (Appendix 1).

b. Friendly troops:

(1) By 25 October 1951, the U.S. Sixth Army consisting of three (3) Corps had been forced to withdraw to the general line (Appendix 2).

(2) III Corps, part of Sixth U.S. Army, is comprised of the 6th and 49th Infantry Divisions on line, and the 41st Infantry Division in reserve. The I Corps is in Army reserve.

2. SPECIAL SITUATION

a. The decision has been made to employ an atomic weapon to effect maximum destruction of the enemy in front of III Corps, and to launch an offensive by the III Corps to drive the enemy to the North from his present position.

b. The III Corps plan includes a withdrawal initially by the 6th Infantry Division, which has been receiving heavy pressure for the past five (5) days, into a defensive formation (Appendix 2). The atomic weapon will be dropped over the ground zero point marked X (Appendix 2) on a D Day H Hour. The 41st Infantry Division now in Corps reserve will attack through the 6th Infantry Division D Day H Hour plus 1, and seize

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ANNEX 3 (cont'd)

objective A (Appendix 2) prepared to continue the attack on order.

3. Special Exercise: The exercise on the ground will be implemented by the employment of one Battalion Combat Team. This Battalion Combat Team will initially organize and occupy one battalion defensive position, and, on order, following the employment of the weapon on D Day H Hour, attack into the contaminated area (Annex 4).

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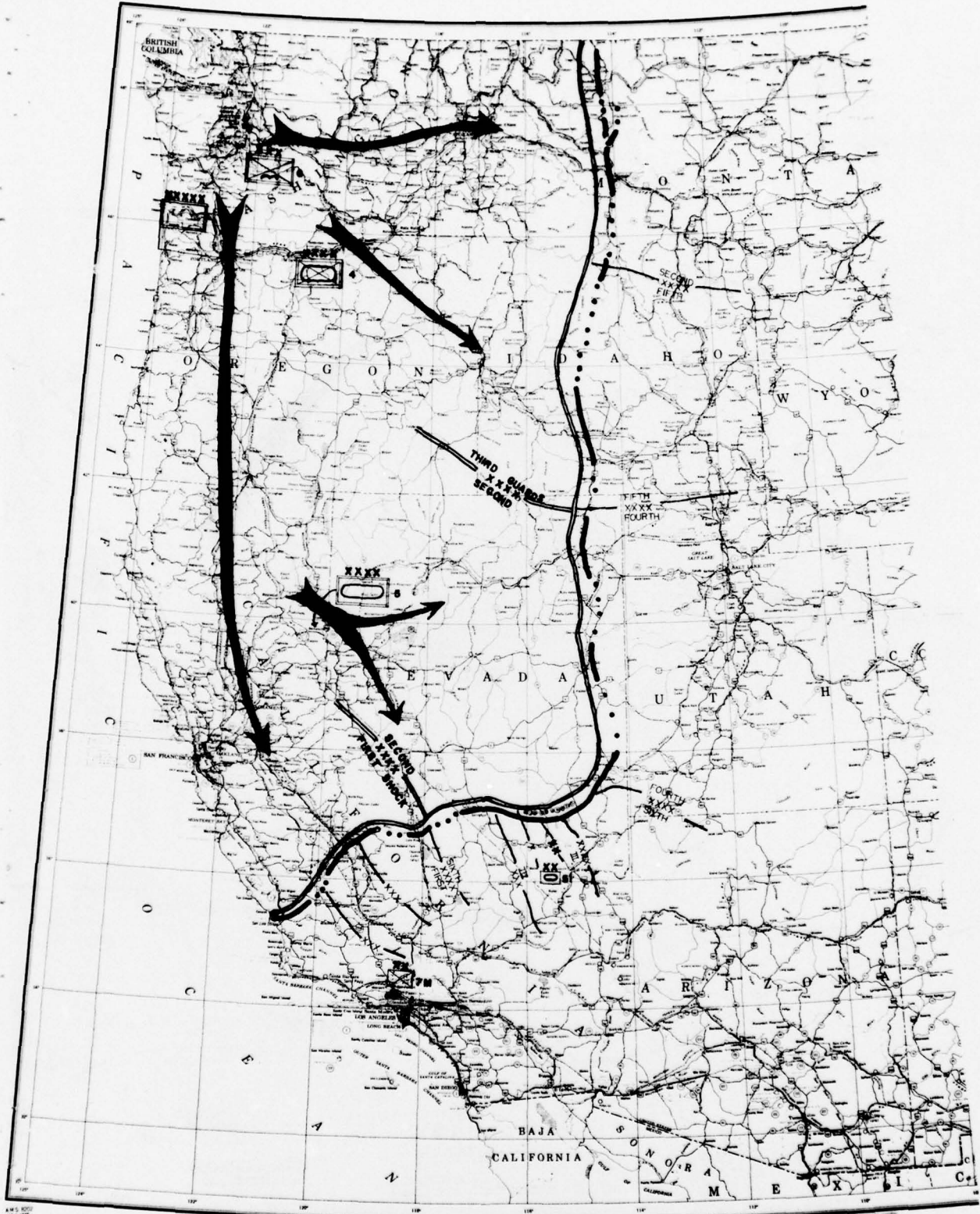
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SIXTH ARMY AREA

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U. S. ARMY AREAS 1:2,500,000

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REV. 1-1946

Approved under the authority of the Chief of Engineers for the Army, War Department, Office of Engineers, Department of the Army, Washington, D. C., December 11, 1945 (Rev. 1-1946). (Scale of Engineers' 1:2,500,000 Army Area Maps, Series 8071) Army National Park Service, National Geographic Society, U. S. Government Printing Office

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SAN FRANCISCO

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SEATTLE

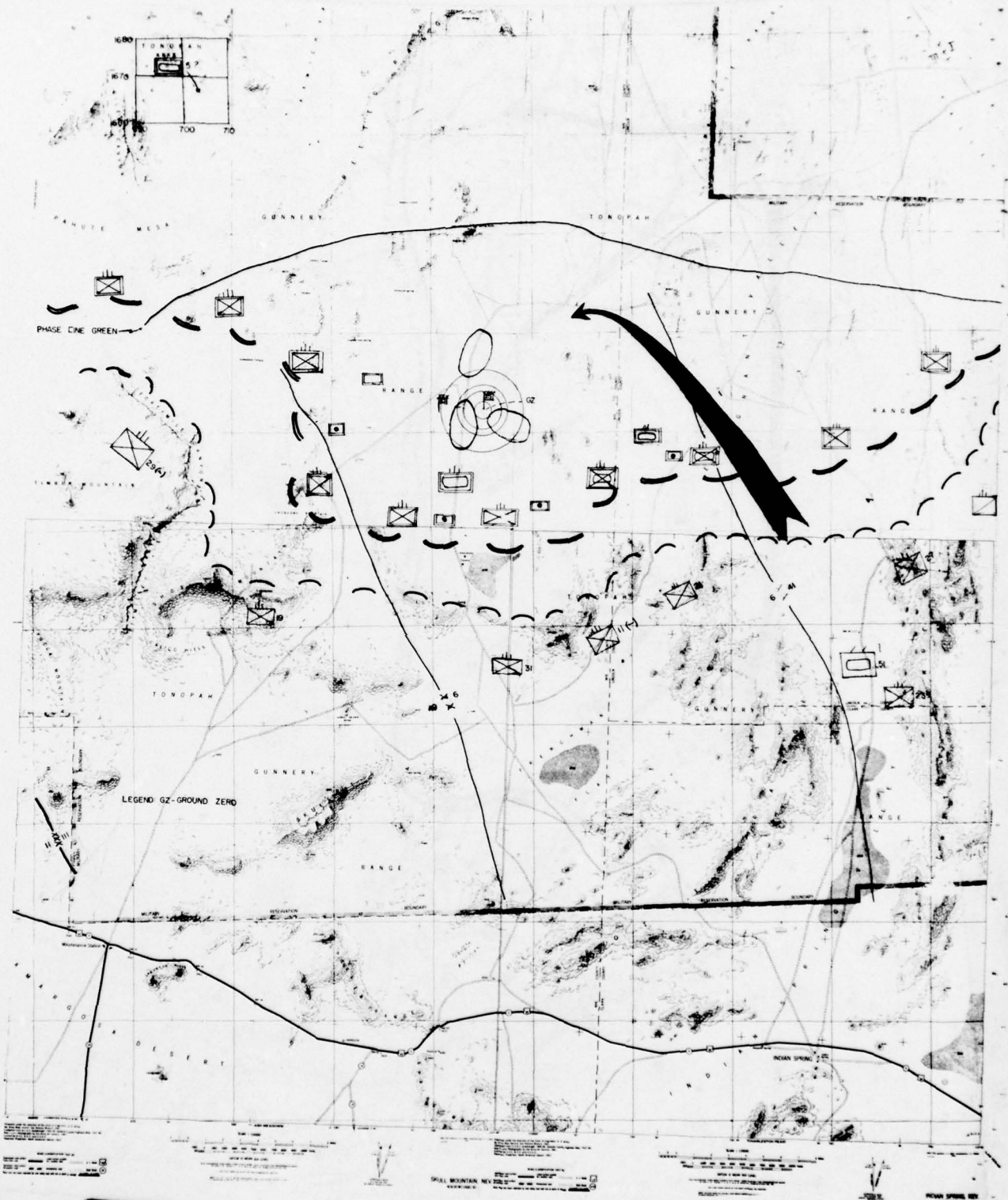
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Hq III Corps  
Cp Roberts, Calif  
18 September 1951

ANNEX 4 TO OUTLINE PLAN OPERATION DESERT ROCK

PROPOSED OPERATIONS AND TESTING PLAN

1. PLAN OF ACTION, BATTALION COMBAT TEAM

a. The battalion exercise is designed to represent one of the battalions of the 6th Infantry Division in the assumed tactical situation. The battalion's position actually prepared on the ground in the test area will represent one of the positions of the assumed division at a distance from ground zero considerably closer than 7,000 yards (the distance from ground zero of the assumed division front), in order to more accurately test the effects of the weapon on the Battalion position (Diagram - Appendix 1).

b. (1) The battalion combat team upon arrival will be indoctrinated, and will be provided with a tactical problem which will require the battalion to prepare a tactical defensive position approximately 3,500 yards from ground zero.

(2) This position is to be completely prepared, weapons emplaced, and the battalion combat team then withdrawn to the prescribed seven (7) mile safety limit for the period of the actual detonation of the weapon. Film badges will be left in each foxhole in the position, as well as most of the combat equipment.

(3) The battalion combat team will be provided an opportunity to observe the effects of the bomb on military equipment and animals that will be tested in the area, and will move by trucks through the previously prepared battalion position. At this point, the troops detruck, inspect the prepared positions, and then conduct the attack, passing through a portion of the contaminated area, returning to a designated point where they will entruck and return to camp for a safety check and decontamination.

2. OBSERVER PARTICIPATION:

a. Observers will be initially indoctrinated, and placed on the seven (7) mile safety limit prescribed. After the detonation of the weapon, they will be conducted forward in organized groups along the center test zone in order from:

(1) 7,000 yard position where animals and equipment are in the open to (2) the battalion position, and thence (3) through the position, to the testing rays to observe the effects on the military emplacements and equipment in these areas (Appendix 2).

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3. TESTING AND EQUIPMENT:

a. This will be conducted in coordination with AFSWP Group (Colonel George). In addition to the equipment that AFSWP is testing, additional military equipment will be provided by this headquarters to be placed in their testing ray (Appendix 2).

b. Technical results will be tabulated, on our equipment, by the AFSWP Group and evaluation forwarded to this headquarters.

c. In addition to the test rays established by AFSWP, this headquarters will establish a test ray of its own (Appendix 2). It will test types of military emplacements, equipment, and some animals at four (4) distances.

d. AFSWP will instrument these emplacements, and provide the resultant data.

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PROPOSED OPERATION DESERT ROCK

SCALE: 1" equals 5,000 yds

INFANTRY DIVISION DEPLOYED FOR DEFENSE

DIVISION FRONTAGE: 23,000 yds (deployed)

DIVISION FRONTAGE: 17,000 yds (prior to deployment)

DIVISION DEPTH: 12,000 yds

BN AREAS: 3,500 yds X

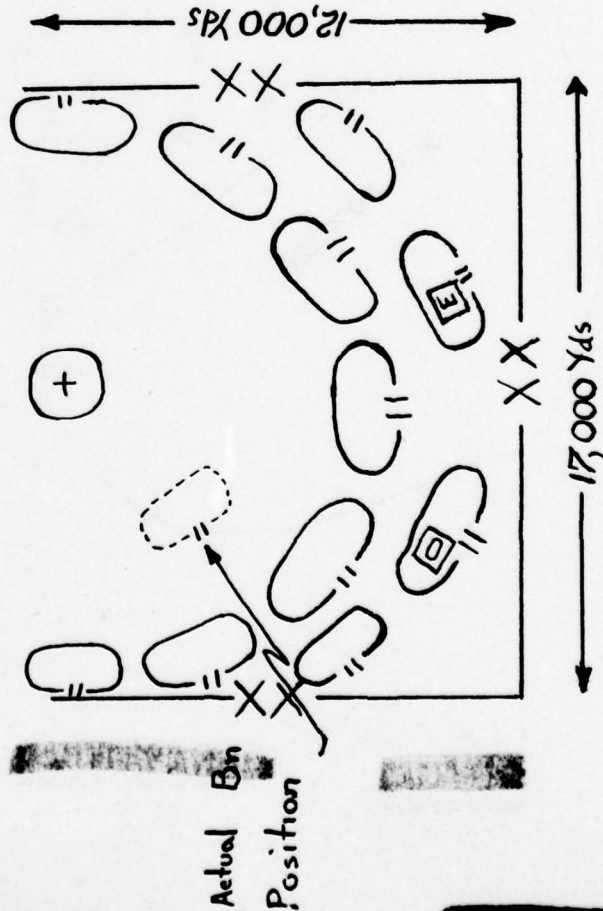
1,500 yds

GROUND OCCUPIED: 2,000 yds X

1,300 yds

DIAGRAM # 1 SECTION D

APPENDIX 1 TO ANNEX 4



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128'

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HEADQUARTERS III CORPS  
Fort MacArthur, California

ORGANIZATION AND FUNCTIONS OF CAMP DESERT ROCK

The Administrative Staff of Camp Desert Rock was organized with Commanding General, III Corps Artillery as Deputy Camp Commander and the staff of the Corps Artillery providing the initial nucleus. III Corps Artillery was assigned the mission of preceding III Corps Headquarters to Desert Rock and organizing and building the camp.

The Artillery Staff completed its plan by coordinating with opposite members on the Corps Staff and receiving information of plans made by the Corps Staff. The Artillery Staff was augmented by the addition of officers and men from the Corps Staff to represent Engineer, Transportation, Adjutant General, Quartermaster, Surgeon, Signal, G-4, and Finance. All personnel of Hq & Hq Btry, III Corps Artillery plus the augmentation from III Corps, arrived Indian Springs on 12 September 1951.

Preliminary reconnaissance of the area, visits to the Commanding Officers of Nellis AFB and Indian Springs AFB and location of initial camp site were completed by the end of the first day.

Heavy equipment necessary for the Engineers to complete their construction work arrived on 15 and 16 September from Fort Huachuca.

On 20 September III Corps Headquarters arrived at the camp site, the two headquarters were merged into one and subsequently divided again into an Operations Staff for the planning of the exercise and an Administrative Staff for the construction, maintenance and operation of the base camp.

The Visitors Bureau and Camp were set up and controlled by the III Corps Armor Officer, supplemented by additional officers. The operation of the Visitors Camp was carried out by the 374th Convalescent Center and the 562nd TC Staging Area Company working jointly under the Corps Armor Officer and his staff. This Bureau was charged with initial planning for all visitors and instructing them prior to their departure from their home stations, setting up their camp, meeting them in Las Vegas and Indian Springs upon arrival, transporting them to camp, registering them, feeding and housing them, transporting them to the Test Site for the exercise, accounting for them, arranging their transportation to home stations and returning them to rail and air terminals. The Visitors Camp was set up to handle a total of 3500 observers in all grades.

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Welfare of the troops was provided by furnishing complete Post Exchange facilities including barber shop and beer parlor, an outdoor movie theatre with seating capacity of 1000 and two subsidiary outdoor movies, four shower points under canvas with lights and heat, two chapels for religious services, Red Cross facilities, pay telephones, telegraph services, bus service for recreation, and a complete Special Service Program. The Special Services, through coordination with the Las Vegas Chamber of Commerce provided recreational trips to Hoover Dam, Charleston Park and other points of interest in the vicinity, and 24 hours all-expense-paid trips to Las Vegas for five Soldiers-of-the-Week each week. Live shows were obtained from Hollywood and there was a daily change of movies in all theatres. Athletic equipment of all types was furnished by Special Services in addition to books and magazines.

Other facilities furnished the troops included electric lights in all tents, hot water for bathing and shaving, asphalted access roads, company streets, and recreational and kitchen areas, garbage and trash disposal service, and regular daily bus service from Camp Desert Rock to Las Vegas. Provisions for regular pay of the troops was made and check-cashing facilities set up for convenience of the personnel of the camp. A water storage point was set up with a capacity of 120,000 gallons. Water hauling capacity was 50,000 gallons per day.

A Quartermaster supply point was established for Class I, II, III and IV supplies. The ration was the "B" ration supplemented by fresh fruits, vegetables, meats and dairy products.

Plans were developed for the dismantling of Camp Desert Rock and the return of all units to their home station, to be accomplished by D/11. However, these plans were cancelled on D/2, November 3, 1951, a telephone call from Commanding General, Sixth Army, was received at III Corps Headquarters ordering the Corps Headquarters, a portion of 92d Transportation Car Company, and the 4th Transportation Truck Company to return to Camp Roberts, California, and information was furnished that Brigadier General Fitch would arrive at Desert Rock on Monday, 5 November 1951, to assume command of Camp Desert Rock and all troops remaining.

2 Incls

1. Organizational Chart - Annex 1
2. Camp Layout Plan - - - Annex 2

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HEADQUARTERS III CORPS  
Camp Desert Rock  
Indian Springs, Nevada

DESERT ROCK EXERCISE  
MEMORANDUM NUMBER 6

22 September 1951

The following troop list is published for the information and guidance of all concerned.

<u>UNIT</u>	<u>HOME STATION</u>	<u>ARRIVED</u> <u>CP DESERT</u> <u>ROCK</u>	<u>ETA</u>
806 APU (Type F)	Ft Lewis	14 Sep	
Det, 597 Engr Lt Equip Co	Ft Huachuca	14 Sep	
231 Engr C Bn	Ft Lewis	14 Sep	
359 Engr Util Det	Cp Cooke	15 Sep	
90 Engr Water Sup Co	Ft Lewis	14 Sep	
Maint Plat, 705 Engr Fld Maint Co	Ft Huachuca	20 Sep	
Det "B" 374 Conv Cen	Ft Lewis	14 Sep	
Det "A" 374 Conv Cen	Ft Lewis	14 Sep	
94 Vet Fd Insp Det	Ft Lewis	14 Sep	
Co "A" 505 MP Bn (-2)	Cp Roberts	15 Sep	
1st Plat, Co A 505 MP Bn	Cp Roberts	13 Sep	
2nd Plat, Co A 505 MP Bn	Cp Roberts	20 Sep	
Hq & Hq Det 393 Ord Bn	Cp Cooke	17 Sep	
161 Ord Depot Co (-)	Cp Cooke	17 Sep	
3623 Ord Co (MM)	Cp Cooke	17 Sep	
Det Hq & Hq Co 53 QM Base Depot Co	Utah Gen Depot	14 Sep	
1 Plat, 539 QM Ldry Co	Ft Lewis	14 Sep	
Det Hq & Hq Co 303 Sig Svc Bn (1)	Cp Cooke	15 Sep	
Det Hq & Hq Co & Co B, 314 Sig Svc Bn	Cp Cooke	15 Sep	
4th TC Trk Co	Cp Stoneman	14 Sep	
92 TC Car Co	Cp Roberts	20 Sep	
Hq III Corps	Cp Roberts	20 Sep	
Hq Co III Corps	Cp Roberts	20 Sep	
Hq III Corps Arty	Ft Lewis	13 Sep	
Hq Btry III Corps	Ft Lewis	13 Sep	
374th Conv Center (-)	Ft Lewis		15 Oct
Co "C" 505th MP Bn	Cp Roberts		28 Sep
1st Plat 523 QM Sub Dep Co (-)	Utah Gen Depot		21 Sep
621 QM Serv Co	Ft Lewis		21 Sep

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<u>UNIT</u>	<u>HOME STATION</u>	<u>ARRIVED</u> <u>CP DESERT</u> <u>ROCK</u>	<u>ETA</u>
Det 504 Signal Base Maint Co	Sacramento		21 Sep
562 TC Staging Area Co	Cp Stoneman		15 Oct
One (1) Bn, 11th Abn Div	Cp Campbell		8-15 Oct*
One (1) Plat Engr, 11th Abn Div	Cp Campbell		8-15 Oct*
Msd Det, 11th Abn Div	Cp Campbell		8-15 Oct*
Btry.C, 546th FA Bn (155)	Ft Lewis		20 Oct

\* Tentative dates for air lift  
Firm dates to be established  
by conference 25 Sep 1951.

BY COMMAND OF MAJOR GENERAL KEAN:

OFFICIAL:

SAMUEL L. MYERS  
Colonel, GS  
Chief of Staff

/s/ Hugh J Socks  
/t/ HUGH J SOCKS  
Colonel, AGC  
Adjutant General

DISTRIBUTION:

"B"  
"C"  
Each atchd Unit (3)

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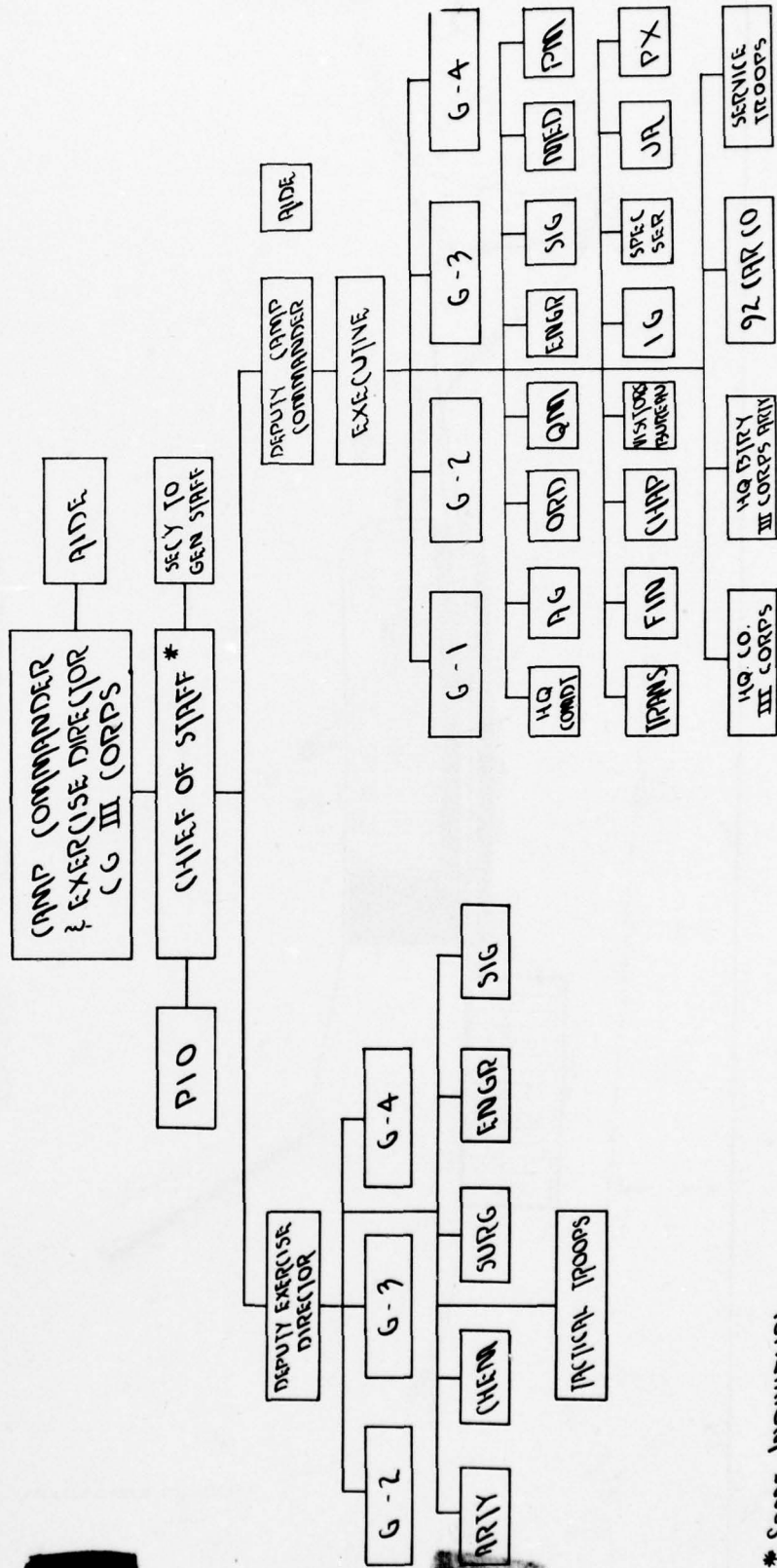
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# ORGANIZATIONAL CHART

## CAMP DESERT ROCK



\* SAME INDIVIDUAL  
REF. DR EX. MEMO #10

III CORPS ENGR SECT

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Camp Desert Rock looking east



Camp water storage point with a capacity of 120,000 gallons. All water had to be hauled 23 miles.

Quarters for VIP's



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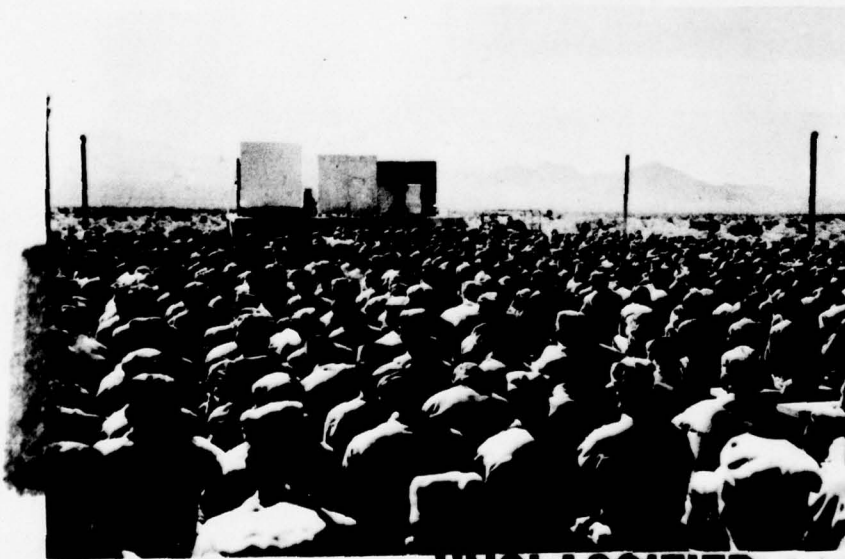
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Looking south from flag pole  
at Camp Headquarters



Tents and wash racks for  
General Officers



Observers being orientated by  
III Corps Staff

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Dental Officer performs emergency treatment



Never a dull moment for a tanker

Religious services for all

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**SECURITY AND INTELLIGENCE**

1. **PREPARATION AND PLANNING.** Preparation and planning for Exercise Desert Rock was undertaken by the G-2 Section on 25 August 1951 and was a continuing process throughout the period of the operation. It became evident at the outset that the conduct of counterintelligence activities would be the primary mission of the G-2 Section. A summary of the major intelligence and counterintelligence functions and responsibilities executed by the section follows:

a. Intelligence.

(1) The Enemy: Appendix D to Annex 3 to Outline Plan Operation Desert Rock, Enemy Situation, was drafted. Since the tactical phase of the operation would entail the actual employment of an atomic missile against a purely notional enemy, it was nevertheless considered appropriate to set up an enemy situation. In accomplishing this, due regard was given to typical formations as well as current tactical doctrine of Communist armies and supporting elements. This is reflected in the enemy capabilities, and their relative probability of adoption, as set forth in subject document.

(2) The Area of Operations: Based upon an air and ground reconnaissance of the test and camp sites, and available maps, a tactical study of the terrain in the Desert Rock area was prepared and disseminated within Headquarters III Corps on 17 September 1951, (see Appendix E, Annex 3, referred to above).

(3) The Weather: (a) A statement of maximum and minimum temperatures in the Las Vegas area between 1 September and 15 November for the period 1945-1950 was obtained from the Air Weather Service, Nellis Air Force Base, Las Vegas, Nevada, and disseminated to the command, (copy of this statement is attached to Appendix E, Annex 3, referred to above).

(b) Arrangements were made with the Air Weather Service, Nellis Air Force Base, Las Vegas, Nevada, for daily weather forecasts to be furnished this headquarters throughout the course of the operation.

b. Counterintelligence.

(1) Security Conferences: Conferences with the security personnel of the Atomic Energy Commission at Las Vegas, Nevada, and with special agents of the Federal Bureau of

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Investigation and representatives of the Offices of Special Investigations, United States Air Force, were initiated on 7 September 1951, at which time the executive officer, G-2 Section, made preliminary contacts in the Las Vegas area and obtained information upon which to base planning of a more detailed nature. On 27 September 1951, a formal conference dealing with the security of Operation Desert Rock was held in Las Vegas, Nevada. Additional conferences were held whenever circumstances warranted, at Camp Desert Rock, Atomic Energy Commission's Camp No. 3, and in Las Vegas, Nevada.

(2) Security Clearances: It was necessary to initiate applications for "QE" clearances for the Corps' Commander and the Corps' G-2 and G-3. The Chief of Staff had been cleared previously. The normal clearances already obtained for the other members of the Corps' staff, with a few minor exceptions, were found to be adequate. On 052200 October, Office of Chief of Army Field Forces issued an order directing that all personnel participating in Operation Desert Rock would have to be cleared for "Confidential". A plan for the accomplishment of this was prepared, approved and implemented. Briefly, the procedure followed was to call upon unit commanders for recommended lists of their personnel for "Confidential" clearances in accordance with provisions of Par 10, IX, 4a (1) (a), SR 380-160-1. Troops not already at Camp Desert Rock were to be cleared at their home stations. This applied as well to the observers who were to attend the exercise. A small number of aliens in the military service and an equally small number of persons for whom clearance could not be obtained were held at Camp Desert Rock and did not participate in the operation.

(3) Access to Camp and Test Site: As a result of the requirements set forth by the Atomic Energy Commission and as a result of discussion with representatives of Atomic Energy Commission security, a Counterintelligence Standing Operating Procedure was prepared and published on 22 September 1951 as Desert Rock Exercise Memorandum Number 4, this headquarters, (see Annex 1). This memorandum was published to all troops and observers participating in the operation and served as the basis for the counterintelligence controls imposed at Camp Desert Rock and within the test site. Its provisions were found to be adequate and their enforcement feasible.

c. Operational Phase: All personnel participating in the operation were given a 30 minute security indoctrination by agents of the III Corps Provisional Counter Intelligence Corps Detachment. The indoctrination was accomplished immediately upon arrival of troops and observers at the campsite, or as soon thereafter as circumstances would permit. This part of the security program for such an operation is considered essential, because it has been found that the security training of our troops, in many cases, is far from satisfactory.

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2. RESULTS, CONCLUSIONS AND RECOMMENDATIONS.

a. Results. The planning and execution of intelligence and counterintelligence activities relating to Operation Desert Rock are considered sound and effective. Such security violations as took place were found to be of a minor and harmless nature, devoid of subversive intent. There were no indications of hostile intelligence activities at the camp or test sites, or in the vicinity of Las Vegas, Nevada.

b. Conclusions. It is concluded that the Soviet Union and its satellites possess other and more fruitful means of collecting United States atomic energy information, and therefore, found the employment of overt or clandestine intelligence activities unnecessary during Operation Desert Rock.

c. Recommendations.

(1) Preservation of respect for military security demands that the lowest possible security classification be given to the exercise at the outset. At the time that this headquarters was conducting its initial planning for Operation Desert Rock under a "Secret" classification, the Atomic Energy Commission in Washington issued a press release containing a considerable amount of information regarding the Operation and the role of the Army therein. Such lack of coordination is avoidable, unnecessary and injurious to the essential requirements of a wholesome security consciousness on the part of military personnel.

(2) A clearly defined counterintelligence policy should be established jointly at Departmental level and announced to all participating agencies well in advance of the date set for the exercise. This headquarters has received but very little guidance from higher authority in this regard during Operation Desert Rock.

(3) A firm and inflexible press and public relations policy should be established jointly, in Washington, by all Federal agencies concerned with the exercise, at the earliest practicable date. The policy should be announced to all planning and implementing headquarters, military and civil, and should be strictly enforced.

(4) A decision regarding the type and extent of security clearances required for personnel participating in the exercise should be reached in sufficient time to permit the accomplishment of the required administrative procedures at the home stations of the units and personnel concerned.

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HEADQUARTERS III CORPS  
Camp Desert Rock  
Indian Springs, Nevada

DESERT ROCK EXERCISE  
MEMORANDUM NUMBER 4

22 September 1951

1. GENERAL.

a. Purpose. This Counterintelligence Directive (CI SOP) standardizes and prescribes normal security procedures relating to Operation DESERT ROCK. It will apply during the entire operation.

b. Unit Procedure. Subordinate units will issue SOP to conform.

2. MILITARY SECURITY.

a. Secrecy Discipline. (1) Strict secrecy discipline will be maintained at all times. All violations, regardless of the degree of severity, will be reported at once to the AC of S, G-2, this headquarters.

(2) Classified material including documents, maps, sketches, overlays, and cryptographic equipment, will be safeguarded in accordance with AR 380-5.

(3) All personnel granted passes for the purpose of visiting local communities will be warned of their individual security responsibilities prior to departure from the campsite.

(4) A member of the Counter Intelligence Corps (CIC) Detachment, this headquarters, will deliver a security briefing to each unit shortly after the arrival of the unit at the campsite.

b. Censorship. (1) No unit or base censorship will be undertaken by military authorities. All personnel will be warned, however, against divulging classified information in personal correspondence.

(2) Such censorship activities as may become necessary will be accomplished by the AEC.

c. Communication Security. (1) Unauthorized personnel will be prohibited from entering or loitering near message centers.

(2) Signal Communication security is a responsibility of designated Signal Corps personnel under the supervision of the Corps Signal Officer.

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(3) Violations will be reported through Signal Channels to the AC of S, G-2, this headquarters.

d. Security of Troop Movements. (1) The actual strength of units participating in the Operation will not be divulged to any person not officially connected with Operation DESERT ROCK.

(2) Shoulder sleeve insignia, vehicle bumper markings, and other unit identification markings need not be removed or effaced.

(3) Movements to and from the maneuver area north of the campsite, and to and from other restricted areas, will be in strict conformance with regulations prescribed by the AEC.

e. Reconnaissance. Reconnaissance of the maneuver area and other restricted places is limited exclusively to official visits by authorized personnel wearing "P" badges (see par 4c) or bearing other media of authorization.

f. Access to Campsite. Access to the Campsite is restricted to the established entrances and exits. Military Police patrols will arrest all endeavoring to enter or leave the camp at other points.

g. Accredited Press Representatives. (1) All persons claiming to represent the public press, radio or similar news-gathering activities will be escorted to the office of the Public Information Officer, this headquarters, where they will be processed.

(2) Properly accredited press representatives, if any, will not be permitted to conduct interviews unless specifically authorized to do so, in each case, by the Chief of Staff, this headquarters.

(3) No press releases will be handed out unless specifically authorized by the Chief of Staff, this headquarters.

h. Unofficial Visitors. Visitors, other than properly identified persons having official connection with Operation DESERT ROCK, will be denied access to the campsite, maneuver area, and other restricted places. They will be detained and reported, by telephone or messenger, to the CIC Detachment, G-2 Section, this headquarters.

i. Photography. (1) Photography of any type, other than that undertaken officially by authorized AEC and AFSWP photographers, is prohibited.

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(2) Unit commanders will make periodic inspections at frequent but irregular intervals to discover cameras and film not already impounded. Such personally owned photographic equipment and supplies will be turned over to the Commanding Officer, 505th MP Battalion, for safekeeping and will be returned to the owner upon departure of the unit. When such equipment and supplies are discovered, the name, grade, serial number and unit of the owner will be reported at once to the AC of S, G-2, this headquarters.

j. Countersubversion. Known or suspected subversive activities, including espionage, sabotage, treason, sedition or the dissemination of hostile propaganda, on the part of any member of the Armed Forces connected with Operation DESERT ROCK, will be reported immediately to the AC of S, G-2, this headquarters, together with a statement of the pertinent facts or allegations.

### 3. CIVIL SECURITY.

a. Jurisdiction. (1) The security control of civilians, other than those employed by the Department of Defense and whose presence at Camp Desert Rock has been properly authorized, is a responsibility of the AEC, FBI, and state and local authorities.

(2) Known or suspected subversive or other hostile activities, including undue curiosity on the part of civilians, or emanating from within the civil population, will be reported promptly to the AC of S, G-2, this headquarters, who will pass the information to the appropriate civil authorities.

b. Control of Circulation. (1) The control of civilian traffic to and from the maneuver area north of the campsite is a responsibility of the AEC.

(2) The control of civilian traffic along US Highway 95 in the vicinity of the campsite is a responsibility of state and local authorities in cooperation with the AEC.

(3) The control of civilian traffic to and from Camp Desert Rock proper is a responsibility of the Army and will be in strict accordance with regulations prescribed by this headquarters.

### 4. MISCELLANEOUS.

a. Unauthorized Absences. The name, grade, serial number, unit and official duty assignment of all military and civilian Department of Defense personnel found to be absent

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without authority will be reported at once to the AC of S, G-2, this headquarters.

b. Security Clearances. All matters pertaining to security clearances of all types relating to military and civilian Department of Defense personnel will be dealt with by the AC of S, G-2, this headquarters.

c. Security Passes and Permits. (1) "P" badges will be issued by the AEC to certain officers and NCO's authorizing admittance to restricted or maneuver areas.

(2) Troops will be passed into restricted or maneuver areas by individuals possessing a "P" badge.

(3) "P" badges will be turned in upon notification AC of S, G-2, this headquarters. Their loss as well as the loss of other official identity documents, cards, etc., will be reported immediately by the most direct means to AC of S, G-2, this headquarters.

BY COMMAND OF MAJOR GENERAL KEAN:

OFFICIAL:

/s/ Hugh J. Socks

HUGH J. SOCKS  
Colonel, AGC  
Adjutant General

SAMUEL L MYERS  
Colonel, GS  
Chief of Staff

DISTRIBUTION:

"B"

"C"

Ea atchd Unit (3)

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HEADQUARTERS III CORPS  
OFFICE OF THE ASSISTANT CHIEF OF STAFF, G-2  
Camp Roberts, California

17 September 1951

TACTICAL STUDY OF THE TERRAIN  
IN THE "DESERT ROCK" AREA

1. THE AREA

a. The area to be studied is located 56 miles northwest of Las Vegas, Nevada, on U.S. Highway 95 and 40 miles east of Death Valley, California. Highway 95 forms the southern boundary of a north-south rectangle extending 58 miles north and 17 miles west. The area is located between:

115 degrees 50' W and 116 degrees 15' W  
36 degrees 31' N and 37 degrees 15' N

b. Map grids used are from maps:

- (1) N.J. 11-11 Army Map Service V502
- (2) N.J. 11-8 Army Map Service V502  
Type F (AMS 1) 1947
- (3) U.S. Dept. of Interior Geological Survey  
Nevada-California  
Las Vegas  
N 3600 - W 11500/60 1908

2. PURPOSE. The purposes of the study are:

a. To determine the general aspects of the area with reference to natural and artificial obstacles and barriers which would hinder a general enemy advance from the northern sector of the rectangle toward the southern boundary at U.S. Highway 95. Such critical points as would make defensive positions for friendly forces as well as points which enemy forces must make secure are noted.

b. To determine general terrain features, as in "a" above, which would hinder a general advance to the north by friendly forces as well as positions which enemy forces could use to good advantage in a defense of the area to the north.

APPENDIX E to Annex 3 to Outline Plan Operation Desert Rock

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c. To determine general terrain features, as in "a" above, which would hinder a general advance to the north by friendly forces as well as positions which enemy forces could use to good advantage in a defense of the area to the north.

### 3. GENERAL DESCRIPTION OF THE AREA

a. Climatic. Existing climate is dry, hot (see appended temperature chart and ENGR OPNS O 1). Wind of approximately 15 MPH from the south to the north from late morning until sunset. Possibility of flash thunderstorms with quick run-off. Otherwise, little or no rainfall, as in the past 14 months.

#### b. Topography.

(1) Drainage system. The entire valley floor appears trafficable, even the dry lake bottoms make desirable locations for air-fields. Stream beds are flat and present no barrier to movement.

(2) Vegetation. There is little vegetation of any sort in the area except for scattered groupings of sparse cactus and sago on the flats. The cactus is no barrier to foot troops or tracked vehicles. The remainder of the sector is non-wooded and uncultivated.

(3) Surface materials. The surface of the valley is a combination of shale, sandstone pebbles, small rocks, fine rock sand, and crust. These materials are well suited for the construction of road beds, providing good drainage as well as traction. Even without a road network, wheeled as well as tracked vehicles may be driven cross-country. The flat surfaces at Yucca Flat and Frenchman Flat provide fine locations for airstrips. One had been constructed at Yucca Flat. (See ENGR OPNS O 1 attached).

(4) Cultural Fratures. The dominant feature of the area is the two lane, high speed road recently built through the area from U.S. Highway 95 north to Yucca Pass. The northern valley is the area unimproved dirt roads from Shoshone Mountain on the west and from a pass north of Skull Mountain across Frenchman Flat provide questionable trafficability for light motor transportation.

### 4. MILITARY ASPECTS OF THE AREA

#### a. Critical Terrain Features.

- (1) Hill 58.00 - 412.00 Altitude 7000  
Observes: enemy buildup area to the north; passes to south; the main valley and road to the south.

If controlled by the enemy this position would provide excellent observation and emplacements for artillery to prevent movement to the north. If controlled by friendly forces this position would permit an attack upon enemy buildup area to the north, and would control the passes adjacent.

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(2) Hill 58.40 - 412.25 Altitude 7135  
Observes: Critical point #1; buildup area to the north; passes toward south; entire northern valley.  
Control of both #1 and #2 necessary before either side will be able to use the mountain passes.

(3) Hill 57.00 - 411.50 Altitude 7500  
Observes: Entire northern valley, road, surrounding ridges and peaks.  
This is the high point of the ridge along the western border of the northern valley. The ridge extends 26 miles to the south. Positions along the entire extent of the ridge must be held to control the northern valley. Even if the enemy breaks through the mountain passes to the north, friendly forces controlling this ridge could prevent utilization of valley by the enemy.

(4) Shoshone Mountain Altitude 6500  
Observes: Dirt road from Shoshone northeast; entire northern valley and surrounding ridges.

(5) Ridge forming eastern boundary of northern valley. Altitude 6000  
Observes: Northern valley; Shoshone road; Yucca Flat and Airstrip.  
Control of this ridge by friendly forces will prevent use of airstrip by the enemy. Artillery fire and observation from this ridge would hinder an enemy advance southward. This ridge forms the western boundary of Emigrant Valley to the east, which is one avenue of approach to the area under study

(6) Yucca Pass 58.50 - 408.80  
High ground here on either side of main N - S road. Fine position for road block and other artificial obstacles. Control of heights here gives absolute control of the road. Ridge on eastern side of road commands Yucca Flat, airstrip, and observes entire northern valley to the north.

(7) Hill 59.50 - 498.60 Altitude 5270  
Observes: Yucca Flat, airstrip, main road south from Yucca Pass, and possible avenue of enemy movement through pass to the north east.

(8) Skull Mountain 57.30 - 407.00 Altitude 5950  
Observes: Flat ground north - a possible avenue of enemy approach from Shoshone Mountain, Frenchman Flat, main road to the east.

(9) Hill 60.00 - 406.90 Altitude 4500  
Observes: Frenchman Flat to the north; road across Frenchman Flat; pass through Spotted Range to the south. No road present through this pass, but possible route of enemy movement.

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(10) Hill 57.60 - 405.40 Altitude 5000

Observes: Pass to west around Spector Range; low ground to Skull Mountain on the north; Highway 95 to the south; base camp to the East; main road north from base camp.

Control of this ridge, with control of #10, will enable friendly forces to prevent enemy movement into the southern valley from either the east or the west.

(11) Belted Range Altitude up to 8600

This narrow range of mountains extends northward for 30 miles from the northwest border of the area under study. This range forms the western border of the enemy buildup area. If attack of friendly forces is successful, this range should be secured for the protection of our northern sector and to prevent any enemy counterattack from the Kawich Valley to the northwest.

b. Observation and Fields of Fire. Observation from the indicated critical points is described under "3a". Influence of vegetation, snow, rain, etc., is negligible.

c. Obstacles. The only natural obstacles to military operations in the area under study are the rugged ridges and mountains. In these areas, use of motorized vehicles would be limited. The use of vehicles on the floor of the valley is unimpeded, except for the occasional flash floods, but can be controlled by the forces in command of the heights which provide excellent observation and artillery positions. Thus the control of the high points around the northern valley is a prerequisite for the success of friendly offensive operations.

d. Concealment and Cover. There is little or no cover or concealment on the valley floor. No ditches, wooded areas, or other cover which would prevent close and accurate observation from the high ground. The cactus covered regions might provide some concealment for ground troops, but such concealment is sparse and easily penetrable. The only defilade is provided by high ground.

e. Avenues of Approach. Access to the area from the east is obtained on Highway 95 which runs westward from Las Vegas past the southern boundary of the sector. A dirt road extends north from Highway 95 through Indian Spring Valley which is 14 miles east of the sector. A branch off this road passes through the Spotted Range into Frenchman Flat. Indian Spring Valley is a 30 mile long narrow valley with high peaks and ridges (5500 ft.) on east and west. This valley would be easily defended by forces holding these ridges, and would protect our eastern flank.

(1) The road through Indian Spring Valley provides fair access to the northern sector as it runs parallel to the Belted Range to the north. (See attached map). The mountains at the northern edge of the sector, critical points #1 and #2, would be difficult to defend without holding the rest of the mountain chain, the Belted Range, of which they form the southern extremity.

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(2) Access to the area from the southwest is achieved by a dirt road running NE from Highway 95 at the junction with State Highway 29. This road can be controlled by forces commanding Shoshone Mountain and Skull Mountain.

(3) Access to the area from the northwest is nonexistent because of rugged mountains and no road or rail net. If the attack by friendly forces is successful, the Kawich Valley to the NW and the mountains extending north on either side, (Kawich and Belted Ranges) should be secured to protect the northern sector.

(4) Access within the area is provided by the two lane asphaltic concrete road extending 30 miles north of Highway 95. Other means of access within the area are provided by the airstrip at Yucca Flat, a dirt road from the southeast across Freachman Flat.

(5) Access within the area under study and in surrounding Valley areas is not necessarily prevented by a lack of roads due to the trafficability of the soil. The sandstone and shale surface provides traction for most wheeled vehicles, which enables them to move across country at random.

(6) Access to the area from the north is achieved through Emigrant Valley or Kawich Valley. These valleys are controlled by Wheelbarrow Peak and Belted Peak in the Belted Range and by Quartzite Mountain in the Timpshute Range at the north end of Emigrant Valley. Smooth Top Mountain, 9340 ft, also guards the northeastern approach to the area.

#### 5. TACTICAL EFFECT OF THE AREA

a. The entire area is 48 miles from north to south and 17 miles from east to west. The mountains and ridges along the east, west and north form an inverted U shape which protects the broad flat valley which extends from north to south. This valley is divided roughly into two sections by a ridge at Yucca pass and a mountain south of Yucca Flat. It is from the passes on either side of critical points #1 and #2 that the expected enemy attack will be launched.

(1) Effect on Enemy Capabilities. Due to the fact that the enemy must launch his attack through passes in rugged mountains, he will not be able to make use of heavy armor initially. Once he has reached the passes, he will approach friendly positions across the Flat valley floor, where heavy armor would be suited. Since observation of the valley floor is excellent in daylight, he will probably move up his ground troops under cover of darkness. The enemy, in order to protect his flanks during such an attack, should try and seize critical areas #1, #2, #3 and #5. He will probably delay moving up his heavy armor through the difficult mountain passes until he has secured these points with the use of foot troops. These same obstacles which will hinder the enemy in an attack will be of great advantage to him in attempting to defend the northern sector against our attack.

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(2) Effect on Courses of Action Required to Accomplish Our Mission. The black top road extending north through

the area which we now hold is a great importance in enabling our forces to be rapidly supplied and equipped from the south, via Highway 95. By use of the black top road and by controlling the critical points which dominate it, heavy armor can be speedily transported as far N as Yucca Pass. The airstrip at Yucca Flat also enables our forces to use light tactical aircraft, and maintain air supply. If our proposed offensive is successful, our forces will be hindered by much the same difficulties in operation as will the enemy in his attack. Our heavy armor will be limited in an attack through the passes to the north and in securing critical points #1, #2, #3, #22, #23, #24, #25 and #26. Therefore, the initial phase of the attack will be supported by heavy armor, but upon reaching the mountains at the north end of the sector, foottroops will have to carry the attack with close air support only. Logistic support will be difficult.

FOR THE A C OF S, G-2:

3 Incls:

1. Sketch
2. ENGR OPN O 1
3. Weather Chart

RICHARD D WEST  
2nd Lt., Arty  
Asst A C of S, G-2

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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
22 September 1951

APPENDIX "D" TO ANNEX 3 TO OUTLINE PLAN OPERATION DESERT ROCK

ENEMY SITUATION - OPERATION DESERT ROCK

1. ENEMY CAPABILITIES

a. Courses of Action. The enemy can:

- (1) Continue his attack with the 8th and 51st Rifle Divisions and the 4th Mechanized Division in the 6th Infantry Division zone.
- (2) Reinforce (1) above with the 13th Tank Division within 9 hours.
- (3) Conduct an enveloping movement on the east flank with 1 Rifle Division along the line CALIENTE-LENDALE-LAS VEGAS.
- (4) Continue current air operations.
- (5) Conduct CEBAR-operations.

b. Discussion and analysis of courses of action.

- (1) During the months of August and September, the enemy has met only limited resistance from friendly forces. As a result of this successful offensive the enemy's morale is high and he is eager for an early completion of the operation which can only be brought about by a continuation of the attack.
- (2) The enemy has in immediate reserve the 13th Tank Division which has not been employed during the current offensive and must be considered as fresh and at full strength. Reinforcing front line elements with this division would greatly increase the enemy's offensive potential, however, due to the terrain it is considered unlikely that capability will be adopted.
- (3) Infantry movements, air supplied, through rugged terrain is a definite enemy capability and could be utilized in the adoption of this capability.
- (4) At present it is estimated that the enemy can mount 165 fighter-bomber sorties per day in support of his front line elements, giving him an equality with friendly tactical air forces.
- (5) The enemy's CEBAR capabilities are approximately equivalent to those of friendly forces and it is believed that they will not adopt this capability except as a retaliatory measure.

APPENDIX 1

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ENEMY CAPABILITIES, Cont.

c. Relative probability of adoption of enemy capabilities.


- (1) Capability la(1) in conjunction with capability la(4).
- (2) Capability la(3) in conjunction with capability la(4).

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MajGen

SHEEN  
G2

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III Corps  
Camp Roberts, California  
104100T Sep 51

ENGR OPNS 0 1

Maps: NEVADA, 1:125,000, WHEELBARROW PEAK, EMIGRANT VALLEY, SKULL MTN  
& INDIAN SPRINGS QUADS.

Task Orgs: 231st Engr C Bn 90th Engr Water Sup Co  
359th Engr Util Det — Engr Fire Fighting Det  
Maint Plat, 705 Engr Field Maint Co  
COMP. Plat 597 Engr light Equip Co  
95 Engr C Bn

1. a. (1) Weather is hot with humidity 15 - 25%.  
(2) Possibility of flash thundershowers & consequent quick runoff.  
(3) Prevailing wind S to N, commencing daily in early afternoon & continuing until evening.  
(4) Soil is predominantly well-graded gravel, with approx 10% powdery fines; uniformity coefficient 50. Sieve analysis at Annex 1.  
(5) Known water resources INDIAN SPRINGS AFB, 130,000 gpd avail to III Corps. Well being drilled vic CAMP DESERT ROCK, but no water yet found at 1175'.  
b. (1) III Corps Etab temp field camp (CAMP DESERT ROCK) SE of SKULL MTN, NEVADA for approx 2 months duration, directs & spts with service tps field exercises vic campsite.  
(2) Annex 2, III Corps Troop List.  
(3) Loaded (20 tons) & heated asphalt distributor avail on 24 hr call from commercial source BAKERSFIELD, CALIFORNIA.
2. Corps engr units spt opn by const & maint of temp camp & access roads, const temp airstrip, supply all water & electricity required, execute specified tactical const, and provide fire protection for CAMP DESERT ROCK
3. a. 231 Engr C Bn  
In priority indicated (Annexes 3A, B, C):  
(1) Layout camp  
(2) Const access road to campsite & supply area.  
(3) Stabilize designated camp areas.  
(4) Const & install field ice boxes mess tables (sitting & standing), wash rocks and latrines.  
(5) Erect tentage.  
(6) Constr airstrip on O.  
b. 95 Engr C Bn:  
(1) Prepare 1:5,000 topographic map (using plan table methods) of designated area.  
(2) Execute designated tactical construction.  
(3) Accurately locate such constr by surveys.

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- c. 90th Engr water Sup Co:
    - (1) Provide water for constr & camp use.
    - (2) Constr & operate water storage point at campsite.
    - (3) Supervise fire protection of campsite.
  - x. (1) BEI: Loc & amount water sources within 20 miles of campsite.
4. a. Corps Engr SF LAS VEGAS by local procurement.  
b. Water SP Initially INDIAN SPRINGS AFB.  
c. QM Cl I & III SP of campsite.  
d. Ord maint of campsite, 5623 Ord M Co.
5. CP: Engr III Corps CAMP DESERT ROCK 130800 Sep 51  
231 Engr C Bn CAMP DESERT ROCK 14 Sep  
90 Engr Wat Sup Co CAMP DESERT ROCK 14 Sep  
95 Engr C Bn YUCCA PASS 21 Sep

LADUE

Colonel, Corps Engineer

- App: 1 - Sieve Anal  
2 - III Corps Tp List  
3A - Vicinity Sketch, CDR  
3B - Camp Layout  
3C - Equipment Schedule

OFFICIAL:

/s/ SCOTT  
Lt Col

Opns 0

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ATOMIC ENERGY ACT 1946

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MAXIMUM AND MINIMUM TEMPERATURES IN LAS VEGAS AREA  
1 SEPTEMBER - 15 NOVEMBER FOR PERIOD 1946 - 1950

Date	1946		1947		1948		1949		1950	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
Sep. 1	100	62	111	72	111	70	107	66	113	79
2	98	60	110	74	110	72	106	79	110	78
3	103	55	107	75	108	70	105	68	108	77
4	104	68	111	69	105	80	104	77	106	77
5	101	77	109	70	105	64	101	74	101	79
6	100	77	107	70	104	61	102	75	91	73
7	98	57	99	80	104	60	103	68	79	64
8	98	59	98	72	103	64	98	71	89	65
9	100	56	96	67	106	62	98	72	92	61
10	103	68	98	62	106	61	94	74	91	61
11	104	70	94	68	107	62	93	70	92	62
12	107	73	99	55	108	66	96	60	92	62
13	108	68	104	56	109	62	93	65	94	60
14	95	73	103	58	106	62	94	56	91	68
15	98	71	103	61	103	68	97	58	92	58
16	88	70	103	69	90	72	100	64	90	66
17	85	59	92	71	92	70	97	63	85	62
18	86	61	85	63	92	64	98	63	85	58
19	90	58	92	52	90	56	101	61	81	56
20	95	50	93	68	94	57	102	67	86	54
21	99	54	98	64	96	54	103	78	88	57
22	94	62	94	65	92	61	104	67	90	56
23	92	58	104	62	93	56	102	62	92	56
24	97	51	106	67	84	63	101	69	92	60
25	102	52	106	66	72	50	99	68	94	59
26	100	58	105	63	81	45	88	64	94	59
27	100	63	104	64	90	43	95	60	94	61
28	101	63	102	64	94	52	91	59	97	61
29	98	61	101	62	95	52	90	54	91	67
30	78	64	95	60	94	63	89	58	78	55
Mean...	97.4	62.6	101.0	65.6	98.1	61.4	98.4	66.0	92.6	63.7

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**MAXIMUM AND MINIMUM TEMPERATURES IN LAS VEGAS AREA  
1 SEPTEMBER - 15 NOVEMBER FOR PERIOD 1946 - 1950**

DATE	1946		1947		1948		1949		1950	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
Oct . 1	81	62	96	52	95	58	92	56	76	51
2	79	51	95	51	97	56	95	61	80	45
3	76	52	99	53	96	59	94	60	85	44
4	76	55	100	56	90	66	95	61	98	47
5	65	46	98	59	90	56	92	64	95	55
6	71	48	93	66	83	61	86	60	89	61
7	75	44	91	66	88	49	73	57	87	55
8	62	53	88	60	93	52	59	43	99	56
9	77	50	90	52	94	50	68	41	95	62
10	77	46	90	64	92	48	74	43	94	60
11	73	46	67	54	88	49	79	64	93	57
12	80	38	63	51	87	51	88	52	97	59
13	82	41	72	50	89	60	87	55	95	59
14	82	43	76	48	82	56	86	58	96	60
15	83	52	79	48	83	52	83	55	91	70
16	72	56	84	52	86	49	83	60	92	66
17	76	44	82	55	83	58	83	54	89	64
18	74	42	88	52	75	48	65	41	87	53
19	78	35	92	53	78	41	57	39	88	50
20	83	46	92	53	85	46	58	38	88	51
21	86	40	76	57	89	43	63	32	86	51
22	84	40	73	48	88	44	67	39	84	50
23	84	50	78	44	86	47	74	37	79	53
24	80	51	79	45	86	45	74	41	85	55
25	85	48	80	44	86	45	75	42	78	60
26	81	48	81	41	82	47	78	41	80	60
27	72	56	82	43	80	42	79	44	78	61
28	67	53	83	47	69	44	80	46	87	52
29	66	42	77	54	70	38	81	46	90	53
30	68	36	79	47	76	47	76	50	84	66
31	67	39	83	44	75	39	75	44	79	57
Mean...	76.2	46.9	83.7	51.9	84.7	49.9	78.0	48.6	87.3	56.2

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MAXIMUM AND MINIMUM TEMPERATURES IN LAS VEGAS AREA  
- 1 SEPTEMBER - 15 NOVEMBER FOR PERIOD 1946 - 1950

DATE	1946		1947		1948		1949		1950	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
Nov. 1	71	34	82	44	75	40	82	44	81	50
2	56	41	69	48	77	48	82	44	82	52
3	62	40	67	39	78	49	81	47	76	57
4	63	40	69	33	66	46	83	45	78	47
5	67	32	63	44	66	32	82	44	77	46
6	68	33	60	36	71	30	80	44	78	47
7	63	36	65	33	70	38	80	44	78	48
8	55	45	69	32	58	39	70	48	83	48
9	59	41	65	32	64	27	65	54	61	43
10	56	28	62	36	64	27	62	40	52	30
11	52	43	64	28	65	40	62	36	58	24
12	48	42	58	40	67	33	69	34	60	24
13	57	44	62	36	74	32	75	39	68	37
14	55	40	62	34	75	33	76	40	61	47
15	63	36	61	30	71	33	78	39	59	36
Mean..	59	38	65	36	69	36	75	43	70	42

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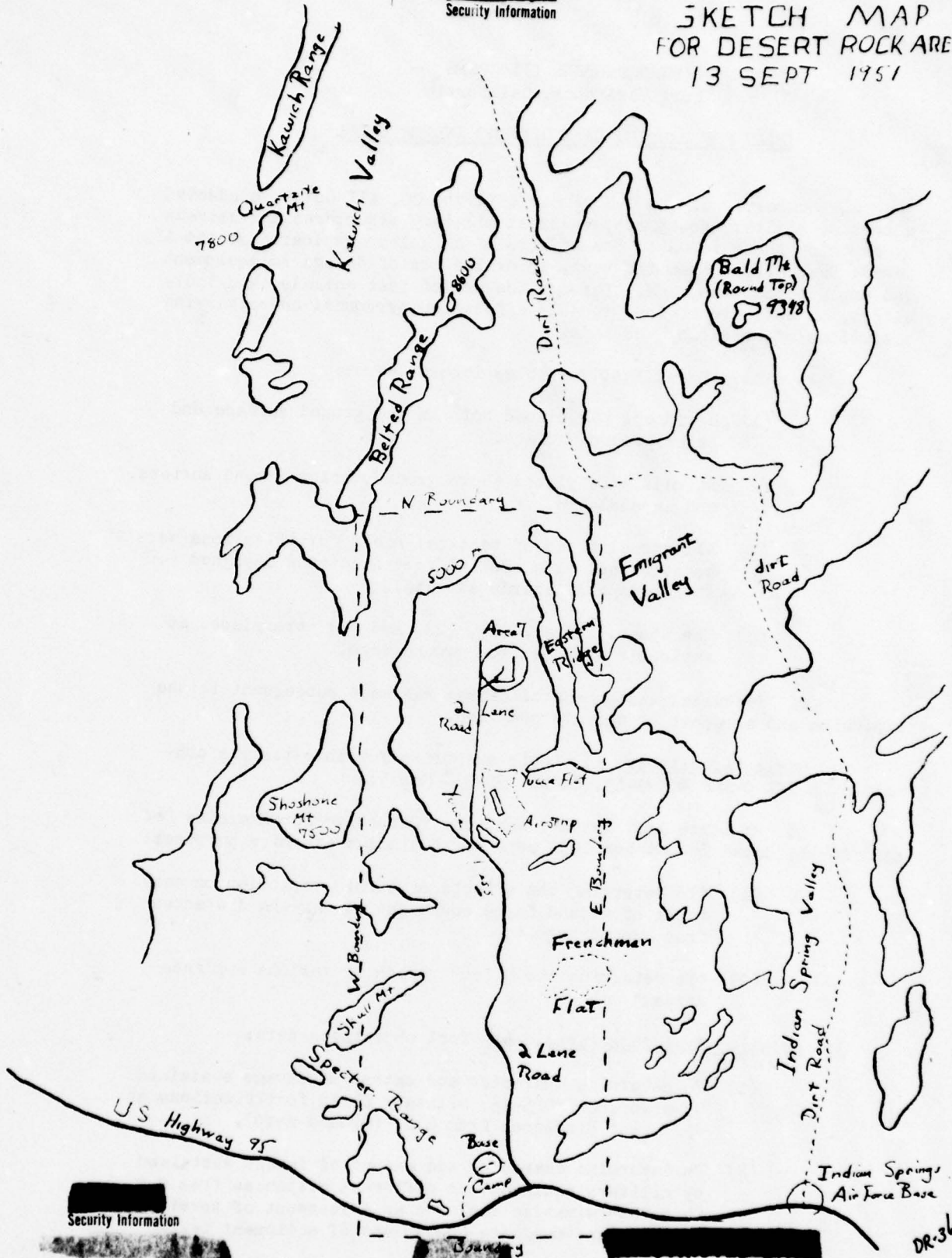
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SKETCH MAP  
FOR DESERT ROCK AREA  
13 SEPT 1951



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HEADQUARTERS III CORPS  
Fort MacArthur, California

PLAN FOR TESTING OF EQUIPMENT AND MATERIEL

1. Summary. a. On 1 November 1951 the CG, III Corps, conducted a test of military equipment, tactical military structures and animals by exposing these items to the effects of a nuclear explosion at the AEC Nevada Test Site. From the test, an evaluation of damage to equipment and emplacements was made. Through the use of test animals, and indicators, an estimate of the probable effects on personnel under varying conditions of shielding was made.

b. The general test variables imposed were:

- (1) Equipment was placed both on the ground surface and below ground surface.
- (2) Animals were placed above ground, below ground surface, and in shelters.
- (3) All normal types of tactical field fortifications were constructed, plus special fortifications designed for the loads and hazards expected.
- (4) The items, in par. (1), (2), and (3) were placed at various distances from ground zero.

c. Technical assessment of damage was made subsequent to the explosion and a report of results compiled.

2. Basic Directives. a. Basic authority for this test is contained in TWX OCAFF ATNG-43, dated 052203Z Sep 51,

b. Hq Sixth Army letter, subject: "Directive for Exercise Desert Rock", dated 16 October 1951 sets forth similar exercise purposes:

- (1) "To determine the effects of atomic explosion on many types of ground force equipment at varying distances from ground zero."
- (2) "To determine the effectiveness of various emplacements."

3. Detailed Test Objectives. a. Test objectives were:

- (1) To determine character and extent of damage sustained by standard (FM 5-15) military field fortifications at different distances from G.Z. (Ground zero).
- (2) To determine character and extent of damage sustained by military equipment at different distances from G.Z. This determination included an assessment of serviceability for immediate combat use of equipment tested.

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- (3) To determine the degree of physiological damage sustained by test animals, at locations both in the open and sheltered, and at different distances from G.Z.
- (4) To determine qualitatively, and to an extent quantitatively, the degree of protection afforded by standard field fortifications from thermal and nuclear radiations, together with the adequacy of such fortifications in resisting overpressure, thermal effects and nuclear radiation.
- (5) To determine the adequacy of specially designed field fortifications in resisting overpressure, thermal effects and nuclear radiation.

4. Means of Reaching Test Objectives. a. Test positions, their contents in general and their nominal distance from G.Z. are shown in the tabulation below:

<u>TEST POSITION</u>	<u>NOMINAL DISTANCE FROM G.Z.</u>	<u>GENERAL POSITION CONTENTS</u>
1	1000 yards	Equip, emplacements, animals
7	1000 yards	Ammunition
2	1500 yards	Equip, emplacements, animals
8	1500 yards	Ammunition
3	2500 yards	Equip, emplacements, animals
9	2500 yards	Ammunition
4	3500 yards	Equip, animals
BCT	3500-5000 yards	Equip, emplacements, animals
5	7000 yards	Equip, animals

b. Field Fortifications

- (1) Three test positions (Positions 1, 2, and 3) at 1000 yards, 1500 yards, and 2500 yards respectively from G.Z. were constructed containing various types of emplacements plus tactical wire.
- (2) A Battalion Combat Team (BCT) was dug and wired in 3500 yards from G.Z.
- (3) As-built sketches were made and photographs were taken of all emplacements prior to the test explosion.

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- (4) Post-shot evaluation of damage was made and recorded by technical personnel, with necessary supporting sketches and photographs.

c. Military Equipment

- (1) Nine test positions (1-5, 7-9 and BCT) contained equipment to be exposed in various attitudes and with varying amounts of protection.
- (2) Location of equipment within these positions, as recommended by appropriate technical services, was recorded.
- (3) Details of time of placement, pre-shot testing of equipment serviceability, identification and location marking, and removal instructions were published in an implementing plan.
- (4) Post-shot evaluation and description of effects was made by a supporting evaluation group from the Armed Forces Special Weapons Project (AFSWP) and III Corps technical service representatives.
- (5) Equipment was removed from test positions on order and evacuated by Technical Services after damage assessment was made, unless technical requirements demanded destruction in place.

d. Test Animals

- (1) Sheep were placed in pens, some of which were protected from direct explosion effects, at positions 1, 2, 3, 4, BCT and 5.
- (2) Film badges, to ascertain nuclear radiation received by sheep, were attached to the animal pens and subsequently evaluated by laboratory technicians.
- (3) Physiological effects of the explosion on the sheep were assessed by AFSWP and III Corps technical representatives.

e. Protection afforded by emplacements

- (1) Film badges and JS-1 thermal indicators were installed in emplacements to roughly indicate the amount of nuclear and thermal radiation received. JS-1 thermal indicators were also placed above ground near the emplacement to indicate the comparative thermal protection afforded by the holes.
- (2) Data obtained from the above instrumentation was evaluated by effects test personnel.

  
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f. Special emplacements

- (1) Two emplacements each at positions 1 and 2 were prepared which were designed, to a degree of analytical precision commensurate with field conditions, to withstand the estimated pressure, thermal and nuclear effects of the explosion.
- (2) Design data were obtained from TM 23-200 'Capabilities of Atomic Weapons' (Secret Classification), dated July 1951.
- (3) Nuclear and thermal indicators were placed in these special positions to indicate the actual protection afforded.

g. Reports. Data furnished by effects test personnel and the AFSWP Effects Evaluation Group were consolidated into a single report. This report is comprised of two sections:

- (1) A description of physical damage sustained by equipment and emplacements. Damage comparison is made in terms of the various distances at which equipment was placed from G.Z. Emphasis is placed on categorizing damaged equipment as serviceable or non-serviceable.
- (2) A field evaluation of damage causative factors, based on technical evaluation by the AFSWP Effects Evaluation Group and data from the Military Effects Line of the Effects Test Group.

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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

Opn O 1 (Operation Thundercloud)

Map: Diagrammatic Sketch, YUCCA FLATS Hq III Corps - Scale Omitted.

Task Orgn:

1st Bn, 188th Abn Regt - Lt Col Tully

Btry C, 546th FA Bn  
One Plat, Co A, 127th Engr C Bn  
3d Bn Med Plat, 183th Air Med Co

Observer Group. Col L. D. Buttolph

Estimated 3200 personnel, organized by platoons. One officer in command of each platoon.

1. a. Current Intelligence Estimates and Summaries.  
b. Tactical Problem, Outline Plan - Hq III Corps 18 Sept 51.
2. III Corps conducts Operation Thundercloud - D-Day - H Hour, YUCCA FLATS, Nevada.
3. a. 1st Bn 188th Abn Regt (Reinforced)
  - (1) Move to observation site No 6 in accordance with March Table (Annex 2). Prepare to occupy defensive positions and atk on order.
  - (2) Participate in exercise in accordance with Annexes 1 thru 7.
- b. Observer Group
  - (1) Move to observation site No 6 in accordance with March Table (Annex 2).
  - (2) Participate in exercise in accordance with Annexes 1 thru 7.
- x. (1) All commanders will be thoroughly familiar with alternate Opn Plan X and Emergency Opn Black (Annexes 8 and 9).  
(2) Positive control measures will be enforced during motor marches by all officers in charge of vehicles or march units and serials.

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- (3) Road priority to AEC control vehicles north of YUCCA PASS.
  - (4) Move personnel and or vehicles north of Position 6 only on orders this headquarters.
  - (5) D-Day H-Hour and M-Hour to be announced.
4. a. Current Administrative Instructions Apply.
  - b. Evacuation
    - (1) Aid Station at Position 6 for participants.
    - (2) Two ambulances will be moved into site following detonation, one each to Pts Blue and Green.
    - (3) Evacuation by ambulance to 374th Clr Plat, Camp Desert Rock.
5. Signal Operation Instructions, Annex 5 (Signal)

KEAN  
Maj Gen

- Annexes:
- 1 - Opn Overlay
  - 2 - March Table
  - 3 - BCT Scenario
  - 4 - Observer Scenario
  - 5 - Signal
  - 6 - M.P. Control
  - 7 - Rad Safety
  - 8 - Alternate Opn Plan X
  - 9 - Emergency Opn Plan Black

DECHOW  
G3

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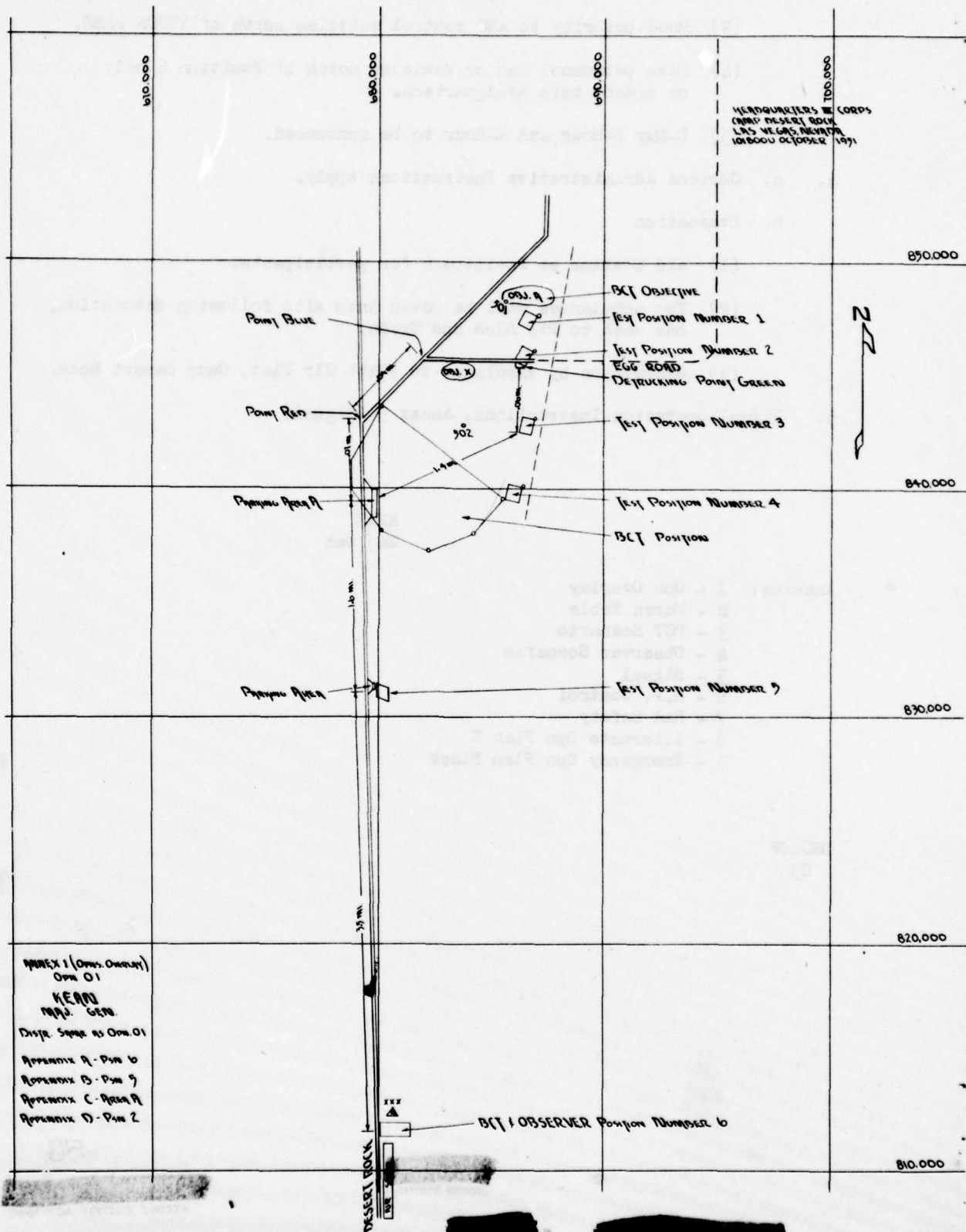
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APPENDIX I (Cont. Overleaf)  
Oms 01  
**KERN**  
MAP. GEN.  
Dist. Same as Oms 01  
APPENDIX A - Pm 6  
APPENDIX B - Pm 7  
APPENDIX C - Pm 8  
APPENDIX D - Pm 2

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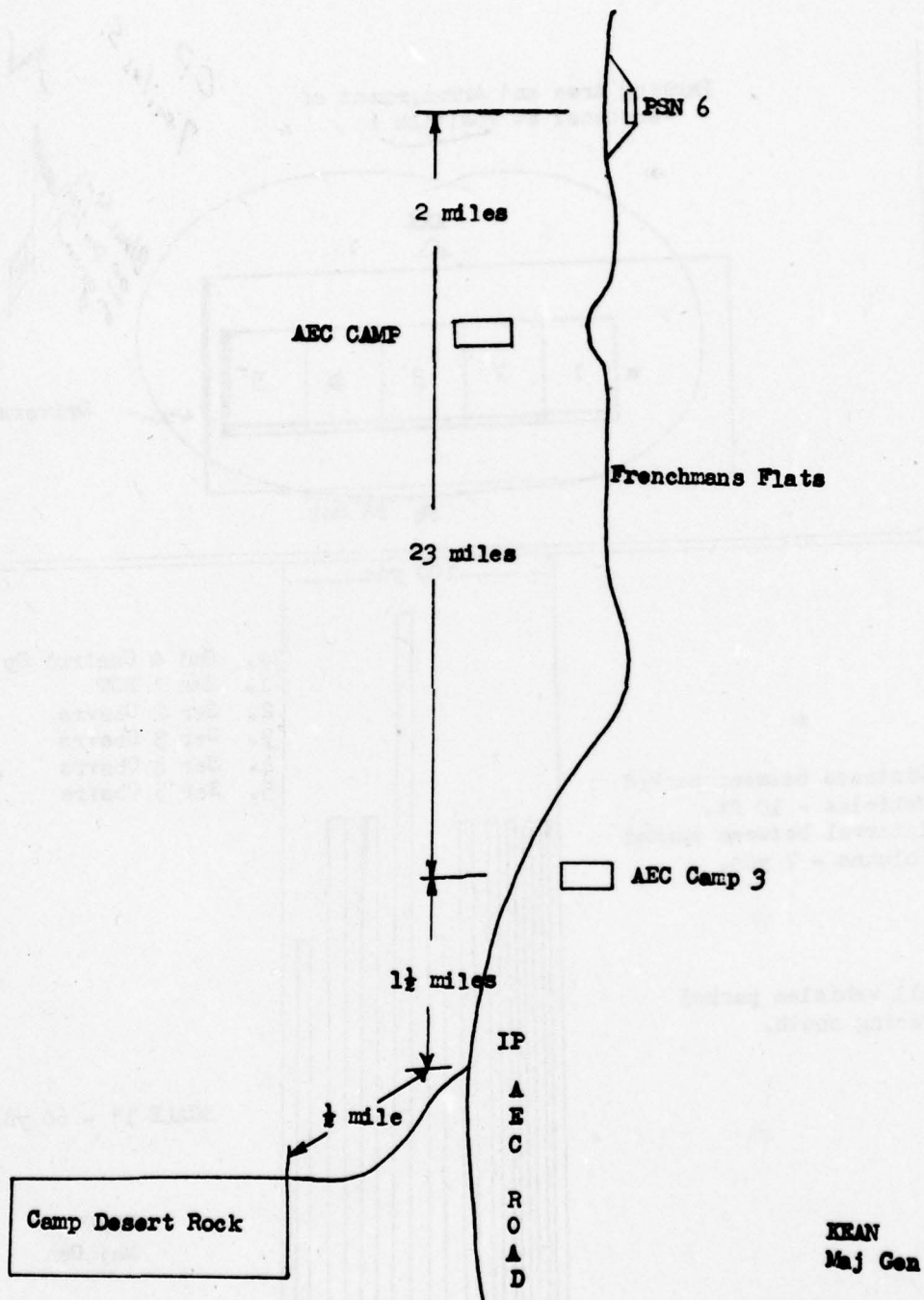
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Headquarters III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

Appendix A to Annex 1 - Opn O 1 Route Map

Total Distance  
27 miles



DECHOW  
63

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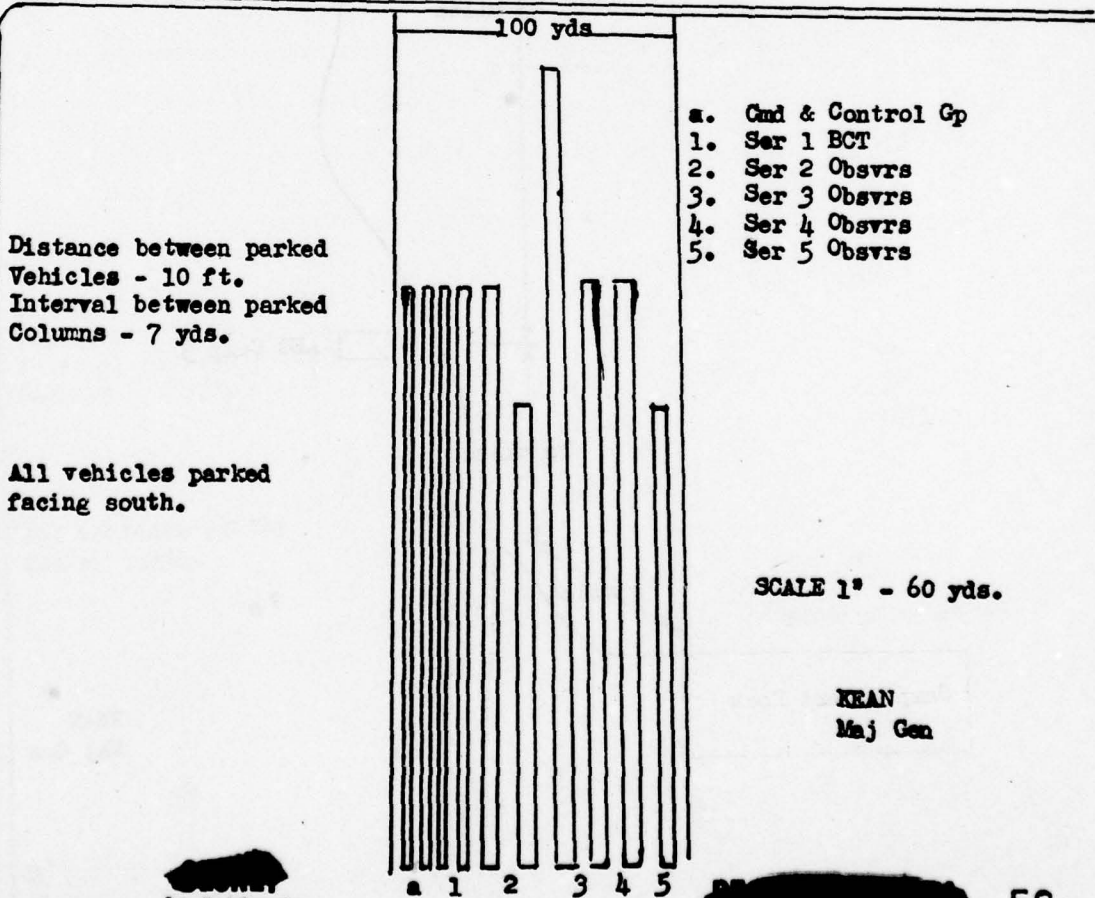
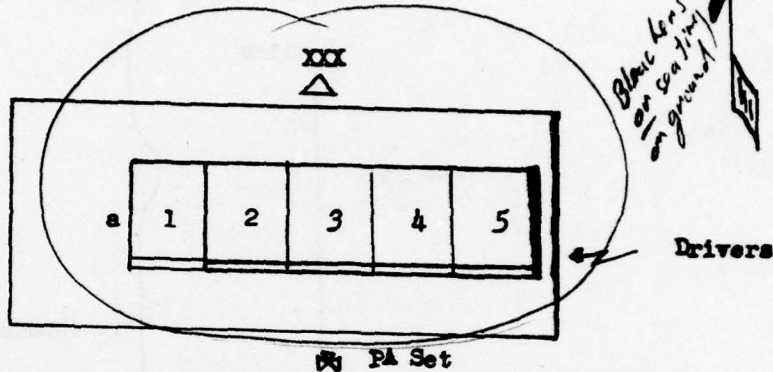
ATOMIC ENERGY ACT 1954

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Headquarters III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

Appendix B to Annex 1 - Opn 0 2

Parking Area and Arrangement of Personnel at Position 6



DECHOW  
G3

~~SECRET~~  
Security Information

~~SECRET~~  
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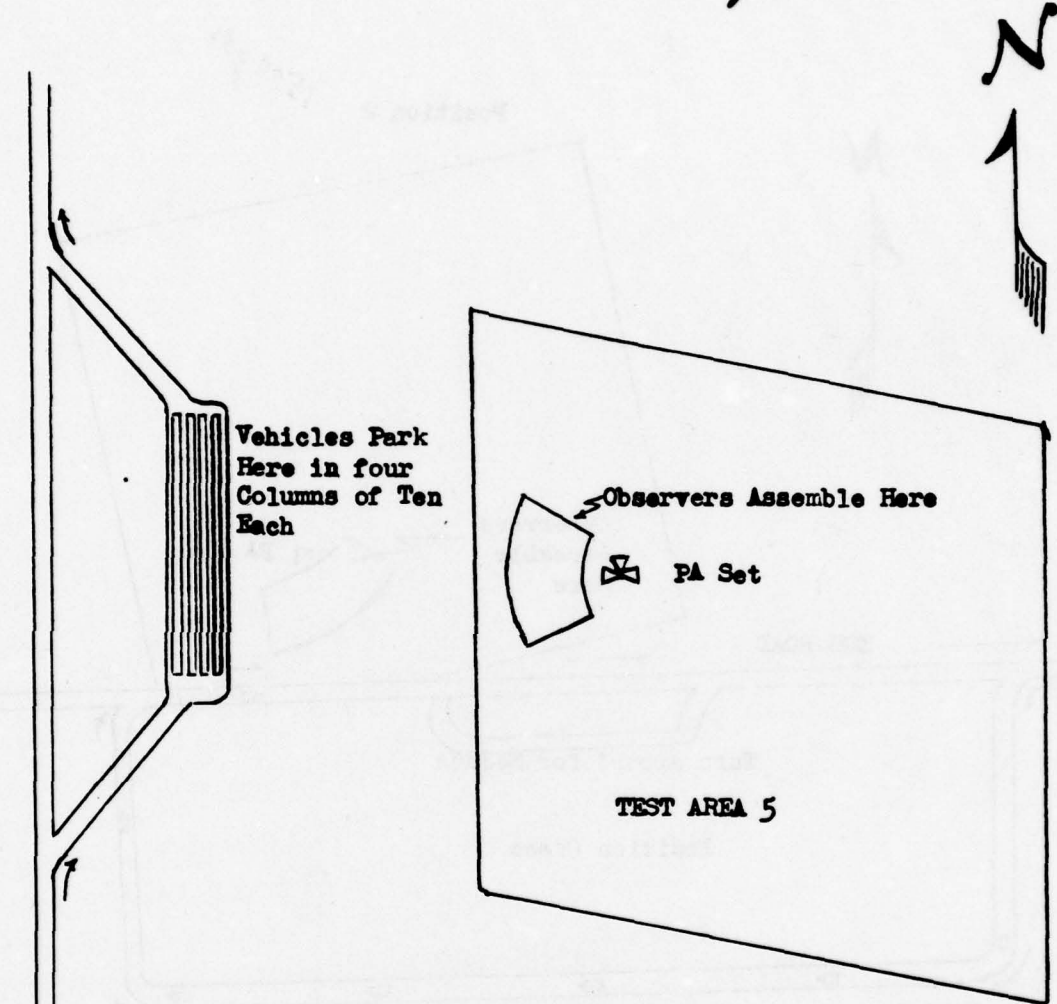
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Headquarters III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

Appendix C to Annex 1 - Opn 0 1

Parking Area and Arrangement of Personnel  
At Position 5 7000 yds



Distance between parked vehicles - 10 ft.  
Interval between parked columns - 7 yds.

SCALE 1" = 60 yds.

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AEC ROAD

DECHOW  
G3

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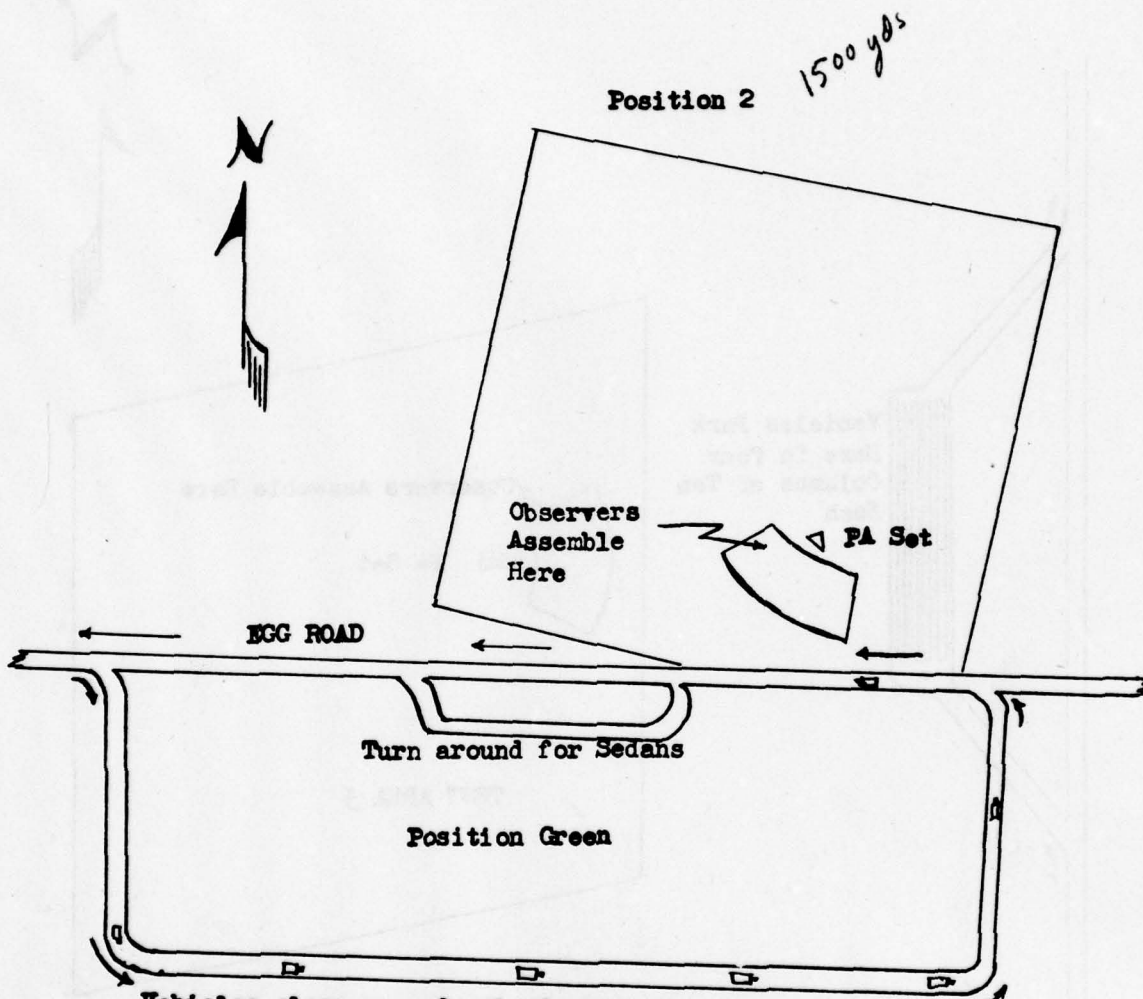
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Headquarters III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

Appendix D to Annex 1 - Opn O 1  
Detrucking point "Green" and Arrangement of Personnel at position 2



Vehicles close up and unload along this road as soon as all observers have cleared Egg Road. Vehicles will depart on schedule and proceed to final EP at BCT Defensive Position.

SCALE 1" = 60 Yds.

Distance between vehicles - 5 ft.

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DECHOW  
G3

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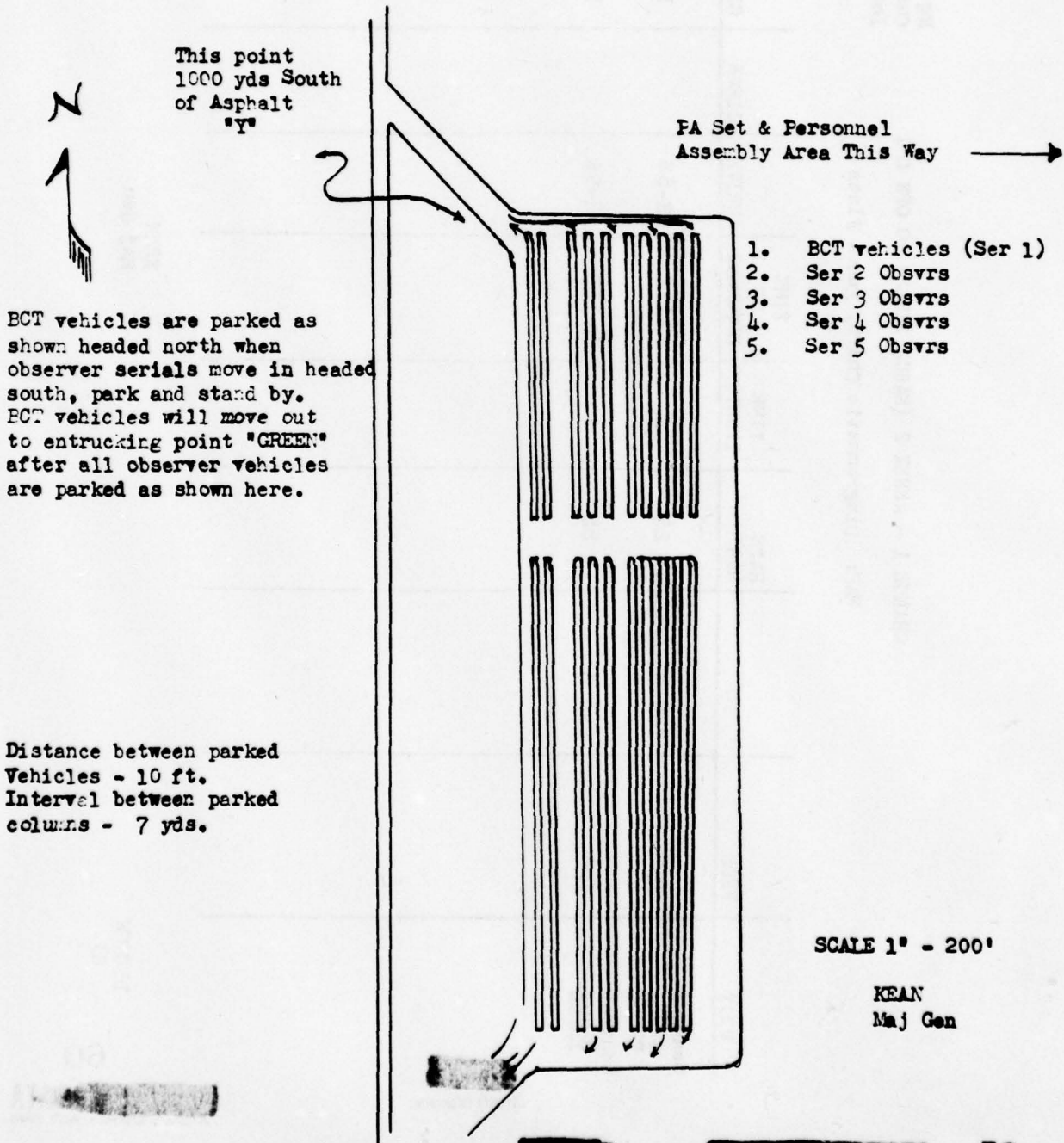
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Appendix E to Annex 1 - Cpn 0 1

Parking Area A Defensive Position - Final  
Entrucking Point for Observers

*5000 yds*



BCT vehicles are parked as shown headed north when observer serials move in headed south, park and stand by. BCT vehicles will move out to entrucking point "GREEN" after all observer vehicles are parked as shown here.

Distance between parked Vehicles - 10 ft.  
Interval between parked columns - 7 yds.

1. BCT vehicles (Ser 1)
2. Ser 2 Obsvrs
3. Ser 3 Obsvrs
4. Ser 4 Obsvrs
5. Ser 5 Obsvrs

SCALE 1" - 200'

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Hq III Corps  
Camp Desert Rock  
Indian Springs, Nevada

CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
Command Group	IP*	Psn 6	25	2	H-118	H-53		H-51	
Control Group	IP*	Psn 6	25	2	H-159	H-94		H-92	

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Indian Springs, Nevada

CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
BCT	Bivouac Area	IP*	15	5	H-152	H-148	H-142		
	Ip	Psn 6	25	5	H-148	H-83		H-77	
	Psn 6	Area "A"	25	5	M/0	M/13		M/19	
	BCT Def Psn	LD 3500yd		3	M/95	M/95	M/98		
	LD	Egg Rd	1 1/2	3	M/95	M/125	M/128		
	Egg Rd	Obj "A" 500yd	1 1/2	3	M/125	M/155	M/158		
	Obj "A"	Psn 2 1500yd	1 1/2	3	M/158	M/185		M/188	
	Psn 2	EP Green	1 1/2	3	M/203	M/206		M/209	
	EP Green	Psn 5 7000yd	25	5	M/244	M/252		M/258	
	Psn 5	Cp DR	25	5	M/278	M/351		M/357	

\* Ip Jdt main Access Rd & AEC Rd

H-hour: Time of detonation

M-hour: Time of movement after detonation

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Camp Desert Rock  
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CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
Serial 2	Bivouac	IP*	15	4	H-122	H-114	H-111	H-46	
	IP*	Psn 6 <sup>7 mi</sup>	25	4	H-114	H-49		M/19	
	Psn 6	Psn 5 <sup>200 yd</sup>	25	4	M/8	M/16		M/51	
	Psn 5	DP Green	25	4	M/39	M/48		M/72	
	DP Green	Psn 2	1 1/2	3	M/54	M/69		M/121	
	Psn 2 <sup>150 yd</sup>	Psn 3	1 1/2	3	M/87	M/118		M/187	
	Psn 3 <sup>200 yd</sup>	Area "A"	1 1/2	3	M/128	M/184		M/285	
	Area "A" <sup>500 yd</sup>	Cp DR	25	4	M/205	M/282			

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CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
Serial 3	Bivouac	IP*	15	5	H-148	H-140	H-136	H-71	
	IP*	Psn 6	25	5	H-140	H-75		M/46	
	Psn 6	Psn 5	25	5	M/34	M/42		M/79	
	Psn 5	EP GREEN	25	5	M/66	M/75		M/100	
	EP GREEN	Psn 2	1 1/2	3	M/82	M/97		M/149	
	Psn 2	Psn 3	1 1/2	3	M/115	M/146		M/215	
	Psn 3	Area "A"	1 1/2	3	M/156	M/212		M/314	
	Area "A"	Cp DR	25	5	M/233	M/310			

IP Jct Main Access Rd & AEC Rd

H-hour: Time of detonation

M-hour: Time of movement after detonation

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CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UN IT	Serial 4	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
		Bivouac	IP*	15	6	M-142	H-134	H-128	H-63	
		IP*	Psn 6	25	6	H-134	H-69		M/76	
		Psn 6	Psn 5	25	6	M/62	M/70		M/111	
		Psn 5	EP GREEN	25	6	M/96	M/105		M/132	
		EP GREEN	Psn 2	1 1/2	3	M/114	M/129		M/181	
		Psn 2	Psn 3	1 1/2	3	M/147	M/178		M/247	
		Psn 3	Area "A"	1 1/2	3	M/188	M/244		M/348	
		Area "A"	Cp DR	25	6	M/265	M/342			

IP Jct Main Access Rd & AEC Rd

H-hour: Time of detonation

M-hour: Time of movement after detonation

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CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
Serial 5	Bivouac	IP*	15	6	H-134	H-126	H-120	H-55	
	IP*	Psn 6	25	6	H-126	H-61		M/108	
	Psn 6	Psn 5	25	6	M/94	M/102		M/143	
	Psn 5	DP Green	25	6	M/128	M/137		M/165	
	DP Green	Psn 2	1 1/2	3	M/147	M/162		M/214	
	Psn 2	Psn 3	1 1/2	3	M/180	M/211		M/280	
	Psn 3	Area A	1 1/2	3	M/221	M/227		M/381	
	Area A	Cp DR	25	6	M/298	M/375			

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Camp Desert Rock  
Indian Springs, Nevada

CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UN IT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
Empty Vehicles	Area "A"	EP Green	25	5	M/178	M/184		M/190	
BCT									

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Camp Desert Rock  
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CHANGE 1 - ANNEX 2 (MARCH TABLE) TO OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLEAR	CLOSE	REMARKS
<u>Empty Vehicles</u>									
Serial 2	DP Green	Area "A"	25	3	M/56	M/61		M/64	
Serial 3	DP Green	Area "A"	25	4	M/84	M/89		M/93	
Serial 4	DP Green	Area "A"	25	6	M/116	M/121		M/127	
Serial 5	DP Green	Area "A"	25	6	M/148	M/153		M/159	

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Camp Desert Rock  
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CHANGE 1 - ANNEX 3 (BCT SCENARIO) TO OPN 0 1

DAY    HOOR

D-1    1000    One film badge per man is issued. An alphabetical roster by company, separate platoon, battery or detachment showing badge number of each man is turned over to AFSWP representative (a copy is kept by unit Commander).

D-1    1100    BCT moves to BCT area (39 - 2½ ton trucks, 7 - ½ ton trucks) concludes preparation of position; leaves in position individual weapons, film badges (clipped between bolt and receiver of individual weapons, equipment and vehicles (except Regt'l Trains). Crew served weapons and selected special equipment will be tagged showing position that equipment occupied so that evaluation can be made by tech services. A guard detail of 3 officers and 10 enlisted men will remain in the area after the BCT leaves to guard equipment in BCT area and position 1, 2, 3, 4, 5, 6.

D-1    1600    BCT clears through AEC Check Point - Yucca Pass. BCT returns to Camp Desert Rock.

D-1    1730    CO BCT reports to CG III Corps (G3) that all personnel are present or accounted for.

D       H-300    CO BCT reports to CG III Corps (G3) that all guards have cleared site area.

D       H-255    Reveille

D       H-210    Breakfast

D       H-165    CO BCT reports to CG III Corps (G3) that all personnel are present or accounted for.

D       H-165    Individual film badges issued.

D       H-157    Entruck. Each truck to be provided with a broom.

D       H-148    Cross IP (RJ Desert Rock Main Access Road and AEC Road).

D       H-142    Clear IP

  
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DAY HOOR

- D H-77 Close on Position 6 (Annex 1, Appendix B). Vehicles will enter parking area 6 from the north and park in columns designated for BCT facing south. All personnel will detruck, move by route designated to observation area. Drivers will form a single line to the south of BCT personnel. Muster will be held.
- D H-57 Report submitted by CO, BCT to CG III Corps (G3) that all personnel are accounted for.
- D H-30 BCT (and observer group) on-the-ground briefing.
- D H-05 PA system is cut in on AEC announcement. All personnel are seated, facing south.

NOTE: M-hour is movement time after detonation.

DAY HOOR

- D H/ Radiological Safety unit and evaluation and control group moves into area on order CG III Corps. ?
- D H/40 BCT moves out in trucks to AREA "A".
- D H/19 Close on AREA "A".
- D H/27 Move to PA system AREA "A". Lt Col Brunsvold on PA system briefs troops. AFSWP
- D H/37 BCT moves to previously prepared positions. Film badges previously left in the position on D-1 will be picked up and turned in to Radiological Safety Office.
- D H/95 BCT jumps off in attack, 15 columns abreast. One monitor from AFSWP precedes each foot column; three monitors from BCT trained in use of instruments will be included in each column. Organic vehicles and crew served weapons except for IIG, 60MM Mortars and Rocket Launchers will be left in position.
- D H/155 BCT arrives objective A. <sup>500 yds.</sup> Each column wheels to the right, columns close up, and move south through position No 1 to position 2. 1500 yd.
- D H/188 BCT walks through and close on position 2; 15 minutes briefing. Captain Hughes on PA system conducts briefing.

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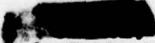
DAY    HOOR

- D    M/209    BCT is mustered, monitored, and turns in individual film  
to       badges. Brooms are available for sweeping off men. BCT  
M/244    entrucks. Personnel necessary to secure weapons, equipment,  
and vehicles left in BCT area will load into the last four  
trucks. An officer of the BCT will be placed in charge.
- D    M/244    BCT moves out. Last four trucks will leave column at BCT  
position to detruck equipment detail. As soon as the equip-  
ment is secured and loaded in organic vehicles, the detail  
will proceed in convoy at 25 MPH to Camp Desert Rock.
- D    M/258    Close position 5, detruck for 5 minute briefing, and  
five minutes observing effects on test equipment and  
materiel.
- D    M/278    BCT, entrucked, begins motor march to Camp Desert Rock.
- D    M/357    BCT closed Camp Desert Rock. Detrucks and showers.

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Camp Desert Rock  
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CHANGE 1 - ANNEX 4 (OBSERVER SCENARIO) TO OPN O 1

DAY    HOOR

- D    H-225    Reveille
- D    H-210    Breakfast
- D    H-165    Roll Call. Issue film badges and entruck.  
Officer in charge of observers reports to CG, III Corps (C/S) that all observer personnel are present or accounted for.
- D    H-140    First serial of Observers (Serial 3) crosses IP enroute to position 6.
- D    H-75    Vehicles reach parking area 6, enter from the north and park facing south (Annex 1, Appendix B). Vehicles will be unloaded immediately upon closing. Groups will be marched in columns of twos northward to assembly area marked for appropriate serial. Platoons will remain in formation. Drivers will assemble in a line south of their respective observer area where they may return to vehicles when necessary to entruck.
- Successive serials will arrive at Position No. 6, park, unload and move to respective group assembly areas.
- A muster will be accomplished by each platoon upon closing into position No 6. MP officer leading the serial will be responsible for muster of drivers under his control. He will report to serial leader. Each platoon leader will submit his report to his march unit leader, who in turn reports to his serial leader. Serial leaders will report to the officer in charge of observers, Col L D Buttolph.
- D    H-30    Officer in charge of observers reports to CG, III Corps (C/S) that all observer personnel are present or accounted for.
- D    H-30 to  
     H-5    Observers briefed on ground by briefing officer.
- D    H-5    Observers face to rear, are seated.

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<u>DAY</u>	<u>HOOR</u>	
D	H/	Briefing following detonation.
D	H/	<u>Radiological Safety unit and evaluation and control group move into site area on order CG, III Corps.</u>
D	H/8	On order CG, III Corps, first observer serial moves out.
D	H/16	First observer serial arrives Position No. 5 (Annex 1, Appendix C). Ten minutes briefing of each observer group. Each group entrucks at conclusion of briefing and proceeds to Position No. 2. <i>7000yd</i>
D	H/51	First observer group closes Detrucking Point "Green" and detrucks. (Annex 1, Appendix D.) <i>which psn #2</i>
D	H/54	First observer group splits into 3 groups, walks through position area No. 2 in 15 minutes, assembles at PA set, and is then briefed at Position No. 2 for 15 minutes. Each group proceeds on foot to Position No. 3 (Annex 1) at conclusion of briefing at Position No. 2. <i>2500yd</i>
D	H/118	First observer group arrives Position No. 3 (Annex 1). Group spends eight minutes observing effects on test equipment, while walking through the area, then moves to to PA set for a seven minute briefing, and proceeds to area "A".
D	H/184	First observer group arrives Area "A" (Annex 1, Appendix E). Each group receives 10 minute briefing. A platoon muster will be held and report submitted to serial leader. <u>Film badges collected.</u> <i>5000yd</i>
D	H/208	First observer group clears Area "A" enroute to Camp Desert Rock.
D	H/381	Last observer group closes Camp Desert Rock.

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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

ANNEX 5 (SIGNAL) TO OPN 0 1

1. a. Command Posts:

Headquarters

Location

Sixth Army  
III Corps

Presidio of San Francisco  
Camp Desert Rock

b. Axis of Communication.

Camp Desert Rock - Position 6.

2. Continuous and reliable communication between all elements of this command will be installed, operated and maintained.

3. a. Detachment, Hq & Hq Company, 303d Signal Service Bn will install, operate and maintain all radio, radio telephone, wire, public address and teletypewriter terminals between Corps and major associated groups, and local service between all echelons of Corps.

b. Detachment, Hq & Company B, 314th Signal Construction Bn will install and maintain all long lines and local pole line and cable construction.

c. Detachment, 504th Signal Base Maintenance Company will maintain and repair all III Corps Signal equipment.

x. (1) Radio silence will be maintained by all radios from H-30 minutes to H+30 minutes.

(2) Maximum use will be made of existing poles for running long line circuits.

4. Corps signal supply and maintenance located at Camp Desert Rock.

5. See SOI index 2.

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Appendix A - Wire Diagram  
Appendix B - Radio Nets  
Appendix C - Public Address Systems

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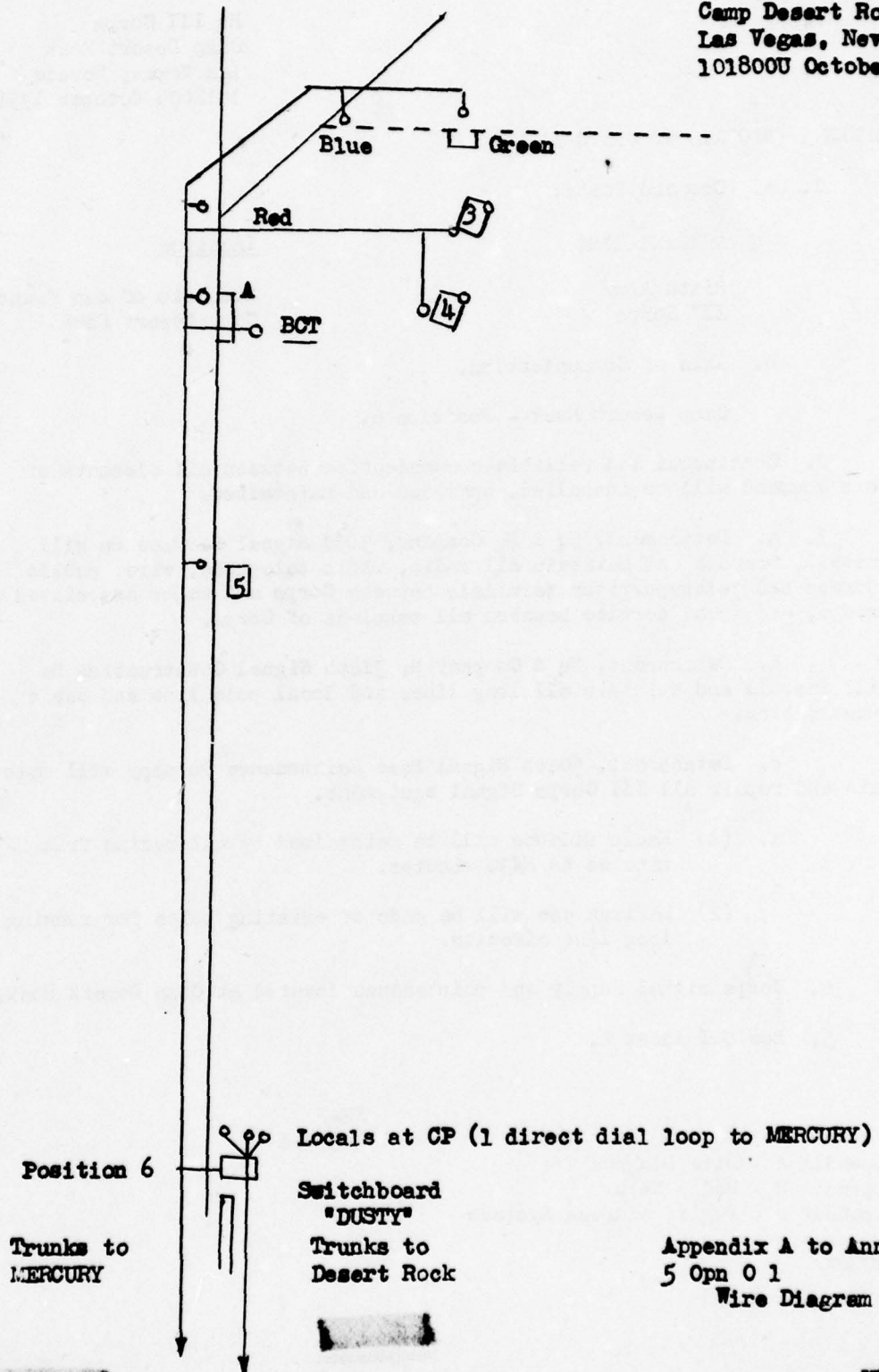
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Headquarters III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

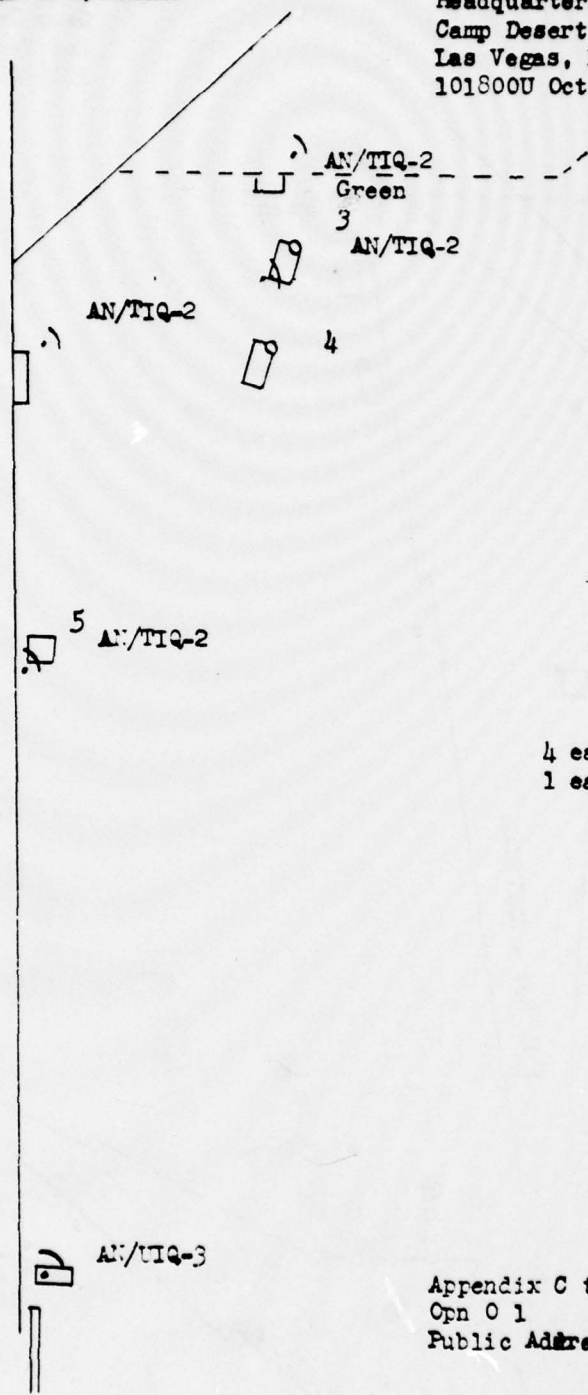


Appendix A to Annex  
5 Opn 0 1  
Wire Diagram





Headquarters III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951



4 ea AN/TIQ-2  
1 ea AN/DIQ-3

Appendix C to Annex 5  
Cpn 0 1  
Public Address System

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Camp Desert Rock  
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ANNEX 6 (MP CONTROL) TO OPN 0 1

1. Omitted.
2. III Corps PM with Co's A and C, 505 MP Bn will control all military traffic during D Day Test Site Area.
3. Operational assignments of the Military Police are as follows:
  - a. PM and Executive Officer of 505 MP Bn will supervise MP operations within test area.
  - b. Four (4) MP Co grade officers assigned to serials 2, 3, 4, and 5 respectively. *Observers.*
  - c. Four (4) officers assigned to supervise the parking, detrucking and entrucking at positions 6 and 5, parking area A, and detrucking point GREEN.
  - d. Six (6) MP NCO's assigned as assistant supervisors at positions 5 and 6, parking area A, and detrucking point GREEN.
  - e. 130 EM assigned as guides. One (1) to each of the vehicles in serials 2, 3, 4, and 5.
  - f. Position 6, Parking Area.
    - (1) One (1) EM assigned to direct traffic into the parking area. (Recap. one (1) off, one (1) NCO, one (1) EM.)
  - g. Position 5, Parking Area.
    - (1) One (1) EM assigned to direct traffic into the parking area. (Recap. one (1) off, one (1) NCO, one (1) EM.)
  - h. Parking Area A
    - (1) Two (2) EM assigned, one (1) to direct traffic into the area from the south, and the second from the north. (Recap. one (1) off, one (1) NCO, two (2) EM.)
  - i. Detrucking Point GREEN.
    - (1) One (1) EM assigned to direct traffic into the smaller turn-around. (Recap. one (1) off, three (3) NCO's, one (1) EM.)

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j. One (1) EM will be assigned to direct traffic and guide the column at check-point RED. 3500(+)<sup>gds</sup>.

k. One (1) EM to direct traffic and guide the column at check-point BLUE. ~ 2000<sup>gds</sup>.

l. One (1) officer and two (2) EM will be assigned to AEC check-point VIC YUCCA PASS D Day-1 to D Day, H-5 hours.

4. Omitted.

5. Appendix A.

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Annex 6

Appendix A - Communications net.

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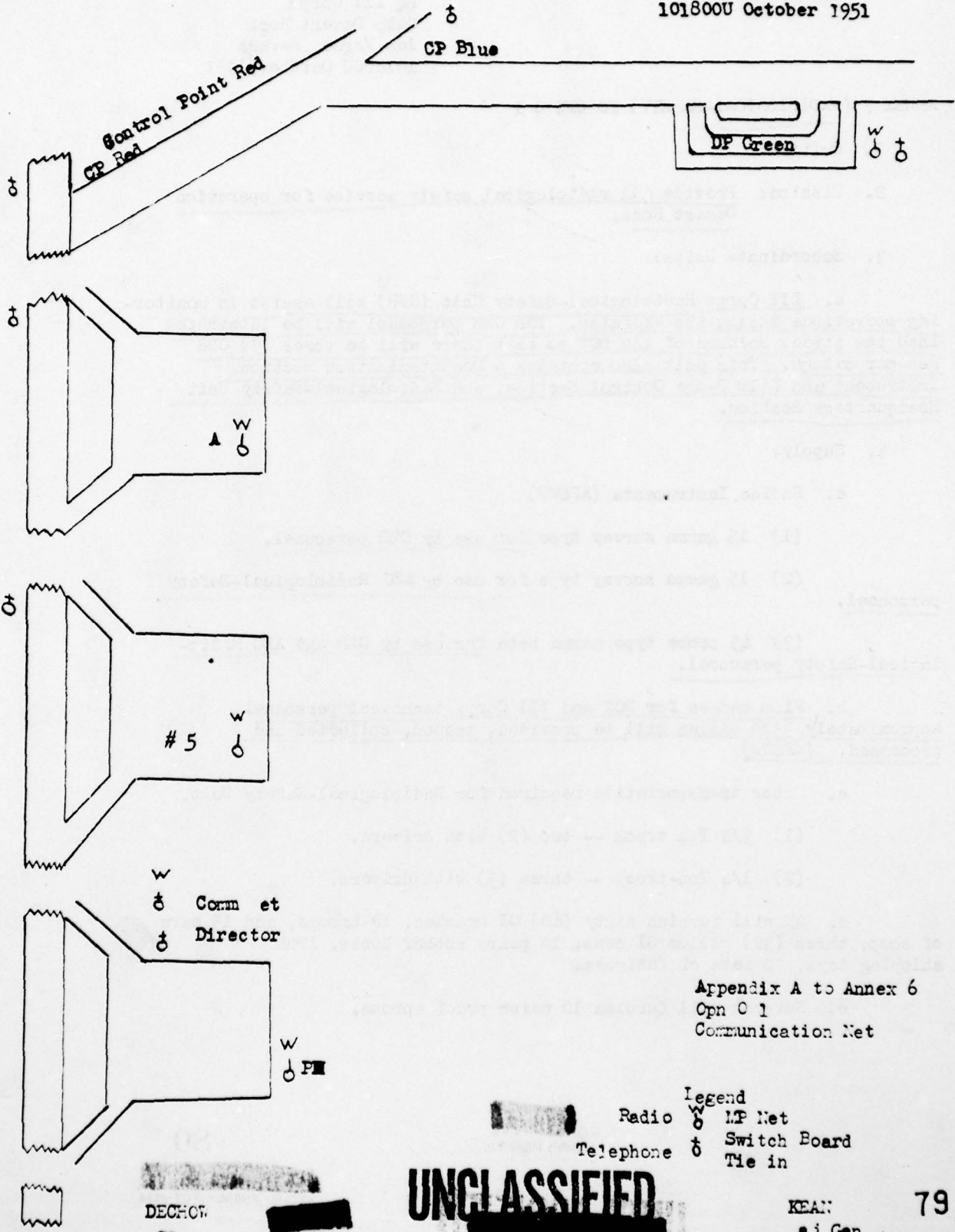
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Headquarters III Corps  
Camp Desert Rock,  
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Appendix A to Annex 6  
Opn C 1  
Communication Net

Legend  
 W Radio  
 ♂ MP Net  
 ♂ Switch Board  
 ♂ Tie in

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Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

ANNEX 7 (RADIOLOGICAL-SAFETY) TO OPN O 1

1. Omitted.
2. Mission: Provide all radiological safety service for operation Desert Rock.
3. Subordinate Units:

a. III Corps Radiological-Safety Unit (CBR) will assist in monitoring operations during the exercise. The CBR personnel will be integrated into the attack columns of the BCT so that there will be three (3) CBR men per column. This unit also contains a Decontamination Section, Instrument and Film Badge Control Section, and Radiological-Safety Unit Headquarters Section.

4. Supply:

a. Radiac Instruments (AFSWP)

- (1) 15 gamma survey type for use by CBR personnel.
- (2) 15 gamma survey type for use by AEC Radiological-Safety personnel.
- (3) 45 probe type gamma beta for use by CBR and AEC Radiological-Safety personnel.

b. Film badges for BCT and III Corps technical personnel. Approximately 5300 badges will be provided, issued, collected and processed. (AFSWP)

c. Motor transportation required for Radiological-Safety Unit.

- (1) 3/4 Ton truck -- two (2) with drivers.
- (2) 1/4 Ton truck -- three (3) with drivers.

d. QM will furnish sixty (60) GI brushes, 10 brooms, and 15 bars of soap, three (32) gallon GI cans, 10 pairs rubber boots, 1000 shipping tags, 30 sets of fatigues.

e. Surgeon will furnish 10 water proof aprons.

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5. Command and Signal

a. Radiological-Safety Unit, Headquarters III Corps, OP,  
(Position No. 6).

b. Radio communication frequencies as determined and assigned by  
III Corps Signal Officer.

c. Radio Nets.

(1) Radio communication will be maintained between BCT and  
Radiological-Safety Unit.

(2) Radio communication will be maintained between one III  
Corps Radiological-Safety Unit 1/4 ton truck and forward Radiological-  
Safety Unit Headquarters.

(3) Radio communication will be maintained between Radio-  
logical-Safety Unit forward OP and AEC Radiological-Safety Unit (AEC  
control OP).

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Appendix A - Radiological-Safety  
Appendix B - Radiological-Safety - Observers  
Appendix C - Radiological-Safety - Form

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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

APPENDIX A TO ANNEX 7 (RADIOLOGICAL-SAFETY) TO OPN O 1

1. Radiological-Safety Unit Organization. III Corps Radiological-Safety Unit will be composed of the following elements:

- a. Corps Radiological-Safety Technical Advisor.
- b. Corps Radiological-Safety Officer (Corps Chemical Officer).
- c. Instrument and Film Badge Control Section (2 Officers and 3 EM who will function under supervision of Corps Radiological-Safety Officer).
- d. Decontamination Team (2 Officers and 10 EM who will operate under control of Corps Radiological-Safety Officer).
- e. Radiological Monitoring Section (approximately 60 EM to be trained in monitoring by AEC Radiological-Safety Instructors). Thirty-six (36) of these come from BCT, nine (9) from Service Troops and fifteen (15) from Chemical Corps School.
- f. Radiological-Safety Headquarters Section (1 radio operator, 1 clerk, 5 drivers, under immediate control of Corps Radiological-Safety Officer).

2. Duties of Instrument and Film Badge Control Section.

- a. Supervise issue and turn-in of film badges by individual units and by Visitors Bureau.
- b. Collect all film badges from unit collectors, and turn them in to the Automatic Film-processing Section.
- c. Issue radiac instruments to monitors, supervise checking thereof, and collect instruments after exercise is concluded.
- d. Receive film badge record of issue from Visitors Bureau and from Commanding Officer, BCT.

3. Duties of Decontamination Team.

- a. Assist AEC Radiological-Safety Decontamination personnel in decontaminating III Corps vehicles and materiel. (All canvas, tools, and excess items will be removed from the vehicles before entering contaminated area. The number of vehicles entering contaminated area will be kept to a minimum.
- b. Establish personnel decontamination center near AEC vehicle decontamination area. This center will consist of a weapons carrier with three (3) 32 gallon GI cans filled with water, 15 GI brushes, and 15 bars of soap.

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4. Duties of Radiological-Safety Monitor Section. Trained CBR monitors will accompany the BCT during its attack. In addition there will be a monitor in each of the five test areas.

5. Duties of Radiological-Safety Headquarters Section.

a. Radio operator will operate radio assigned Radiological-Safety Headquarters section.

b. Clerk will maintain necessary records.

c. Drivers assigned as follows:

3/4 ton truck (2)

1/4 ton truck (3)

6. Schedule for Radiological-Safety Technical Adviser (AFSWP). At a time after H Hour, coordinated with initial AEC survey, make initial survey of entire test area. CG III Corps will be advised of Radiological Safety situation prior to movement of troops and observers from Position 6 and also prior to BCT attack.

7. Schedule for Instrument and Film Badge Control Section.

a. H-190 issue film badges to BCT and III Corps personnel participating in the exercise.

b. M/58 collect film badges previously left in the BCT defensive positions, from BCT CBR monitors. These will be delivered to Automatic Film-Processing Section (AEC).

c. M/218 issue geiger counters to CBR monitors.

d. M/218 collect film badges worn by BCT during operation and deliver them to Automatic Film-Processing Section (AEC).

8. Schedule for Decontamination Team. M/196 be prepared to decontaminate BCT personnel, vehicles, and materiel, as required.

9. Schedule for Radiological-Safety Monitor Section.

a. D-1 issue film badges to BCT under supervision of Instrument and Film Badge Control Section. These badges will be placed in BCT defensive positions. Monitors will supervise emplacement of badges. Badge will be attached to rifle by placing cellophane corner against the receiver and letting the bolt forward on it.

b. H-30 draw radiax equipment at Position 6 and check to insure proper operation. AEC monitors will supervise.

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c. M/48 collect badges from BCT defensive position and turn them in to Instrument and Film Badge Control Section.

d. M/80 to M/198 minutes assist AEC monitoring during attack.

e. M/194 to M/223 monitor BCT personnel for possible personal or clothing contamination. This procedure will be supervised by AEC Radiological-Safety Monitors. An individual whose clothing reads in excess of 20 mr/hr indicated beta plus gamma as read on probe type geiger counter with the "window" open and counter held six (6) inches from the contaminated area of the person, will be instructed to thoroughly brush his uniform. (Brushes will be provided to the monitoring personnel, (1) one per man.) If clothing still reads in excess of 20 mr/hr the individual will be separated from his column and transported to the personnel decontamination station.

f. M/201 to M/223 collect film badges worn by the BCT throughout the exercise and turn them over to Instrument and Film Badge Control Section. Individuals with excessive contamination who are transported to the personnel decontamination center will be accompanied by a previously designated monitor who will collect the film badges following decontamination. A monitor will turn them over to Instrument and Film Badge Control Section.

10. Military monitors from AEC Radiological-Safety Unit will consist of 15 monitors attached to III Corps for the exercise. Their duties are:

a. D-1 accompany BCT to area while equipment is being placed into position. Supervise the check of radiac instruments to be utilized by CBR personnel.

b. H-30 supervise the check of radiac instruments to be utilized by CBR personnel.

c. M/80 to M/198 minutes, perform continual monitoring during the BCT attack.

d. M/194 to M/223 supervise CBR personnel during monitoring of clothing of BCT.

e. M/213 to M/223 prior to departure, check vehicles and provide a written pass to each vehicle driver indicating the presence or absence of contamination.

11. AEC Automatic Film processing truck personnel will consist of 2 officers and 5 EM. Their duties are:

a. Process all film badges utilized during the exercise.

b. Records will be kept indicating accumulated dosages and the films will be preserved as a permanent record.

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Hq III Corps  
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Las Vegas, Nevada  
101800U October 1951

APPENDIX B TO ANNEX 7 (RADIOLOGICAL-SAFETY - OBSERVERS) TO OPN O 1

1. The following procedure will govern film badging of Observer Group:

a. Film badges will be issued to all observers and collected by Visitors Bureau.

b. Upon issue of the numbered badges, which will be carried in a breast pocket, a record will be made of the individual's name, rank, SN, organization, and home station (for civilians, official capacity and home address) Appendix C.

c. When the badges are picked up, they will be turned over to the Signal Mobile Automatic Processing Truck (AN/TSC2). Badges will be issued to the observers prior to their departure to the observers area on D Day at  $n - 165$  minutes. Badges will be picked up at Area A. 5000 yds.

2. a. The Observer Group will not enter a radioactively contaminated area, nor proceed closer to ground zero than Egg Road. 7000 yds #2,

b. Zones of contamination will be predetermined prior to observers' departure from Area 6 by Radiological-Safety Unit. 1500 yd

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101800U October 1951

APPENDIX C TO ANNEX 7 (RADIOLOGICAL SAFETY FORM) OFN 0 1

FORM FOR RECORDING FILM BADGE ISSUE AND PROCESSING RESULTS

FIELD FORTIFICATION FILM

<u>NAME</u>	<u>SERIAL</u> <u>NUMBER</u>	<u>ORGANIZATION</u>	<u>HOME</u> <u>STATION</u>	<u>FILM</u> <u>BADGE NUMBER</u>	<u>TOTAL</u> <u>DOSAGE</u>
-------------	--------------------------------	---------------------	-------------------------------	------------------------------------	-------------------------------

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PERSONAL FILM

<u>NAME</u>	<u>SERIAL</u> <u>NUMBER</u>	<u>ORGANIZATION</u>	<u>HOME</u> <u>STATION</u>	<u>FILM</u> <u>BADGE NUMBER</u>	<u>TOTAL</u> <u>DOSAGE</u>
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ANNEX 8 (OPN PLAN X)

MAP: Diagrammatic Chart of YUCCA FLATS.

Task Orgn: No change.

1. Omitted.
2. III Corps prepares alternate operation plan to be executed following detonation in event that Radiological Safety Regulations prevent movement forward of Egg Road. (Opn 0 1)
3. a. 1st Bn, 188th Abn Inf Regt (Reinforced).
  - (1) Be prepared to execute Plan X in accordance with Appendices A & B.
  - b. Observer Group.
    - (1) Be prepared to execute Plan X in accordance with Appendices A & C.
  - x. Annexes 1, 5, 6, & 7 prescribed in Opn 0 1 remain in effect.
4. Current administrative instructions.
5. Annex 5 Opn 0 1.

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Appendix A - March Table - Plan X  
Appendix B - Scenario for BCT - Plan X  
Appendix C - Scenario for Observers - Plan X

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*AIT plan:  
Not executed.*

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APPENDIX A TO ANNEX 8 OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
1018000 October 1951

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLPAR	CLOSE	REMARKS
BCT	Psn 6	Area A	25	5	M/40	M/15		M/20	
	Def Psn	LD	1 1/2	3	M/80	M/80	M/83		
	LD	Obj "X"	1 1/2	3	M/110	M/110		M/113	
	Obj "X"	Psn 3	1 1/2	3	M/117	M/141		M/114	
	Psn 3	Psn 4	1 1/2	3	M/154	M/176		M/179	
	Psn 4	Area A	1 1/2	3	M/189	M/229		M/232	
	Area A	Psn 5	25	5	M/257	M/261		M/266	
	Psn 5	Cp DR	25	5	M/286	M/359		M/364	

H-hour: Time of detonation  
M-hour: Time of movement after detonation

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APPENDIX A TO ANNEX 8 OPN O I

MAP: Diagrammatic Chart, Yucca Flats

Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
1018000 October 1951

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CL7AR	CLOSE	REMARKS
Serial 2	Pen 6	Psn 5	25	4	M-26	M-34		M-38	
	Psn 5	Area A	25	4	M/58	M/62		M/66	
	Area A	Psn 3	1 1/2	3	M/63	M/139		M/142	
	Psn 3	Psn 4	1 1/2	3	M/152	M/174		M/177	
	Psn 4	Area A	1 1/2	3	M/187	M/227		M/230	
	Area A	Cp Dr	25	4	M/237	M/314		M/318	

H-hour: Time of detonation

M-hour: Time of movement after detonation

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APPENDIX A TO ANNEX 8 OPN O 1

Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
141800Z October 1951

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLPAR	CLOSE	REMARKS
Serial 3	Psn 6	Psn 5	25	5	M/50	M/58		M/63	
	Psn 5	Area A	25	5	M/83	M/87		M/92	
	Area A	Psn 3	1 1/2	3	M/109	M/165		M/168	
	Psn 3	Psn 4	1 1/2	3	M/178	M/200		M/203	
	Psn 4	Area A	1 1/2	3	M/213	M/253		M/256	
	Area A	Cp DR	25	5	M-263	M-340		M-345	

H-hour: Time of detonation  
M-hour: Time of movement after detonation

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EXERCISE DESERT ROCK LAS VEGAS NV  
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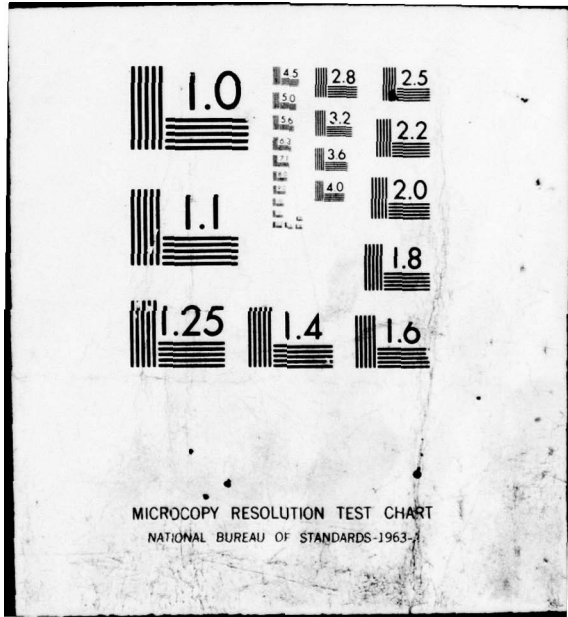
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-1



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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800 October 1951

APPENDIX A TO ANNEX 8 OPN O 1

MAP: Diagrammatic Chart, Yucca Flats

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CL/FAR	CLOSE	REMARKS
Serial 4	Psn 6	Psn 5	25	6	M/75	M/83		M/89	
	Psn 5	Area A	25	6	M/109	M/113		M/119	
	Area A	Psn 3	1½	3	M/136	M/192		M/195	
	Psn 3	Psn 4	1½	3	M/205	M/227		M/230	
	Psn 4	Area A	1½	3	M/240	M/280		M/283	
	Area A	Cp DR	25	6	M/290	M/367		M/373	

H-hour: Time of detonation  
M-hour: Time of movement after detonation

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APPENDIX A TO ANNEX 8 OPN 0 1

MAP: Diagrammatic Chart, Yucca Flats

Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

UNIT	FROM	TO	RATE MPH	TIME LENGTH	TIME OF MOVEMENT	ARRIVE	CLAR	CLOSE	REMARKS
Serial 5	Psn 6	Psn 5	25	6	M/101	M/109		M/115	
	Psn 5	Area A	25	6	M/135	M/139		M/145	
	Area A	Psn 3	1 1/2	3	M/162	M/218		M/221	
	Psn 3	Psn 4	1 1/2	3	M/231	M/253		M/256	
	Psn 4	Area A	1 1/2	3	M/266	M/306		M/309	
	Area A	Cp DR	25	6	M/316	M/393		M/399	

H-hour: Time of detonation  
M-hour: Time of movement after detonation

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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

APPENDIX B TO ANNEX 8 (SCENARIO TO BCT - PLAN X) TO OPN 0 1

1. Plan X will be executed from Position 6 only on order CG III Corps.
2. Movement to Position 6, Annexes 1 and 2, Opn 0 1 - No change.

DAY HOUR

- D M/80 Bn attacks to Obj X.
- D M/110 Bn reaches Obj X. Columns close up, each column wheels to the right and proceeds to position 3.
- D M/144 Bn closes on position 3. 10 minute orientation.
- D M/179 Bn closes position 4. 10 minute orientation.
- D M/189 Bn departs position 4 and proceeds to Area A, closing at M/232. All personnel of the BCT will be monitored, and a muster taken. Bn entrucks and proceeds to position 5 at M/257.
- D M/266 Close on position 5 for a 10 minute orientation.
- D M/286 Depart position 5.
- D M/364 Close into Camp Desert Rock.

Note: M Hour: Time of movement after detonation.

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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

APPENDIX C TO ANNEX 8 (SCENARIO FOR OBSERVERS - PLAN X)

1. Plan X will be executed from Position 6 only on order of CG III Corps.
2. Movement to Position 6, Annexes 1 and 2, Opn 0 1 - no changes.

DAY TIME

- D 1426 First observer serial entrucks and moves to position 5 (march table - Appendix A). 10 minute orientation for each group.
- D 1458 Following orientation, first observer serial moves to Area "A".
- D 1462 First observer serial arrives Area "A". Receives a 10 minute orientation.
- D 1483 First observer serial proceeds to position 3 on foot.
- D 1499 First observer serial arrives position 3. Receives 10 minute orientation, proceeds to position 4 on foot.
- D 1474 First observer serial arrives position 4. Receives 10 minute orientation. Proceeds to Area "A" where serial will entruck.
- D 14237 First observer serial departs Area "A" for Camp Desert Rock.
- D 14313 First observer serial closes Camp Desert Rock.
- D 14399 Last observer serial closes Camp Desert Rock.

Note: 1-Hour: Time of movement after detonation.

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*Emergency evacuation  
Not executed*

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Hq III Corps  
Camp Desert Rock  
Las Vegas, Nevada  
101800U October 1951

ANNEX 9 (EMERGENCY OPN BLACK) TO OPN O 1

OPN PLAN BLACK

MAP: Diagrammatic Sketch, YUCCA PASS, Hq III Corps - Scale Omitted.

Task Orgn: No Change.

1. a. Omitted.

b. Omitted.

2. III Corps will be prepared on order to execute a total evacuation of test site area during D Day phase of the exercise.

3. a. 1st Bn, 188th Abn Regt (Reinf):

(1) FROM POSITION NO 6: Be prepared on order to entruck and proceed to Camp Desert Rock. Be prepared for further motor movement on order.

(2) UPON RECEIPT OF ORDER WHILE EXERCISE IS IN PROGRESS: Consolidate battalion units, and move to Parking Area "A" by most direct route. Be prepared for return movement to Camp Desert Rock on order.

b. Observer Group:

(1) FROM POSITION NO 6: Be prepared on order, to enbus and entruck by serials in order serial No 2, 3, 4,5, and move to Observer Camp, Camp Desert Rock.

(2) UPON RECEIPT OF ORDER WHILE EXERCISE IS IN PROGRESS: Officers in charge of Groups will move groups expeditiously by most direct route to Parking Area "A". Groups will load in busses or trucks immediately upon arrival, and proceed to Observers Camp, Camp Desert Rock.

x. (1) Command, LP, Medical, and AEC control vehicles will take road priority.

(2) Code word to execute this operation will be "Condition Black", transmitted by all Signal means simultaneously.

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- 4. Omitted.
- 5. a. Current SSI and SOI.
  - b. Annex 5 Opn 0 No 1.
  - c. Emergency Signal means: Red Star Cluster.

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HEADQUARTERS III CORPS  
Camp Desert Rock  
Las Vegas, Nevada

AMCDC-GCT 322

SUBJECT: Letter of Instructions

TO: Commanding Officer  
1st Battalion 188th Abn Inf Regt

1. Effective upon arrival of your unit at Camp Desert Rock the following missions are assigned.

a. Preparation of your unit and orientation of your leaders for the tactical exercises to be conducted as part of Exercise Desert Rock.

b. Continued training of your unit so far as your operational mission will allow.

c. Execution of these missions on a time schedule which will fit into the scheduling of Exercise Desert Rock.

2. It is desired that upon arrival at Camp Desert Rock, your advance party plan and execute an initial reconnaissance of the Battalion defensive position which you will organize and occupy.

a. Upon completion of this reconnaissance the Engineers are prepared to stake out on the ground for you the company positions which are to be organized and occupied.

b. When your battalion has closed into the area, it is desired that you begin at once the organization of this defensive position. The position will be a complete defensive position, to include revetment of all emplacements and protective and tactical wire.

3. In order to assist you in your planning and phasing, the following detailed information is furnished you:

a. A proposed schedule of events from 12 October to 31 October 1951 (incl No 1).

b. A copy of Outline Plan Desert Rock which will provide you with the tactical concept of the exercise, and the general method by which it will be accomplished. (incl 2)

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c. Two Battalion problems, Battalion in the attack and Battalion in defense, which are designed as the structural background for your actual work on the ground. (Incls 3 and 4)

d. A detailed diagram of your proposed battalion defensive position, designed to assist you in laying out the position on the ground. (Incl 5)

e. A copy of Operation Order No 1, this headquarters, which implements the exercise, and provides you in detail, information as to the time and place of your movements on D Day, and coordinates the operations of your battalion into the exercise itself. (Incl 6)

4. It is desired that the following plans be submitted to this headquarters for approval on the dates indicated:

a. Your initial plan for the organization of the assigned defensive position -- 16 October 1951. (Overlay form only)

b. Recommended changes, if any, in the detailed organization of the ground from those contained in Inclosure 5 -- 19 October 1951.

c. A training schedule which will include the time for training of 15 CBR monitors from within your battalion, and for the orientation of all personnel of your unit -- 15 October 1951.

5. My headquarters will assist you in every way possible in preparation of your detailed plan, and in the execution of these plans on the ground.

6. I wish to express my pleasure in having your organization assigned for this exercise, and my hope that you and your men will take advantage of every opportunity to exploit this exercise in such a manner that the maximum training may be achieved.

W. B. KEAN  
Major General, USA  
Commanding

6 Incls

1. Schedule of Events
2. Outline Plan (withdrawn and issued separately)
3. Attack Plan
4. Defense Plan
5. Battalion Defensive Position
6. Operation Order 1 (Withdrawn and issued separately)

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SCHEDULE OF EVENTS

12 October to 31 October 1951

- October 12 1st Serial BCT arrives.  
BCT will move from airhead to bivouac area and prepare camp.  
Tents have been erected and cots are available in area.  
Initial reconnaissance continues.  
Engineers tape company areas.
- 13 Second Serial BCT arrives.  
Continue improving bivouac area.  
Initial reconnaissance continues.  
Engineers tape company areas.
- 14 Third Serial BCT arrives.  
Continue improving bivouac area.  
Complete initial reconnaissance.
- 15 BCT close Desert Rock.  
Continue improving bivouac area.
- 16 BCT prepares for movement to defense positions.  
Train 15 CBR personnel as monitors. (Rad-Safety unit conducts instruction.)
- 17 BCT occupies and organizes defense position. *other shots?*  
Train monitors.
- 18 BCT continues improvement of defensive position. "
- 19 BCT continues improvement of defensive position. "
- 20 Orientation lecture for all personnel. (AFS&P instructors furnished to Battalion.)  
CPX with all leaders prior to rehearsal. (Scheduled by Hq III Corps)
- 21 Rehearsal of problem.  
BCT returns to Camp Desert Rock. "  
Critique.
- 22 BCT day off.
- 23 BCT training in Camp Desert Rock.  
Preparation for return to site area.
- 24 Improve defensive position as necessary. "
- 25 Improve defensive position as necessary. "  
Bn and Co commanders review orientation with units.
- 26 BCT training in Camp.  
Improve position as necessary.

Incl 1

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October 27 Second rehearsal of problem.  
BCT returns to Camp Desert Rock.  
Critique.

28 BCT Schedule to be announced.

29 " " " " "

30 " " " " "

31 " " " " "

Incl 12

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161 Inf Regt  
Camp Desert Rock, Nevada  
101200U October 1951

OPERATION ORDER THUNDER CLOUD (Attack)

MAPS: Indian Springs and Skull Mountain  
Quadrangle 1/125,000-Diagrammatic Chart, Yucca Flats

1. a. Aggressor forces are concentrated in the area of Objective A  
(Annex 1, overlay).

b. 41st Inf Div attacks D Day, H Hour following detonation of an  
atomic weapon, through 6th Inf Div, destroys enemy in objective A, continues  
attack to the northeast on order (Annex 1, overlay).

2. 161 Inf Regt (implemented by 133th Abn Inf Regt) attacks D Day,  
H Hour, objectives, boundaries, (Annex 1, overlay).

3. a. First Battalion; attached:

Btry C 546th FA Bn

One Platoon, A Company, 127 Engr (C) Bn

3d Bn Med Platoon, 188th Med Company

(1) Attack D Day, H+1½, seize objectives, overlay.

a. Report immediately upon reaching phase lines 1,  
2 and 3.

(2) Destroy enemy in zone.

(3) Be prepared to continue attack to the northeast on  
order.

b. Second Battalion

(1) xxxxxx

Incl

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ATOMIC ENERGY REGULATIONS

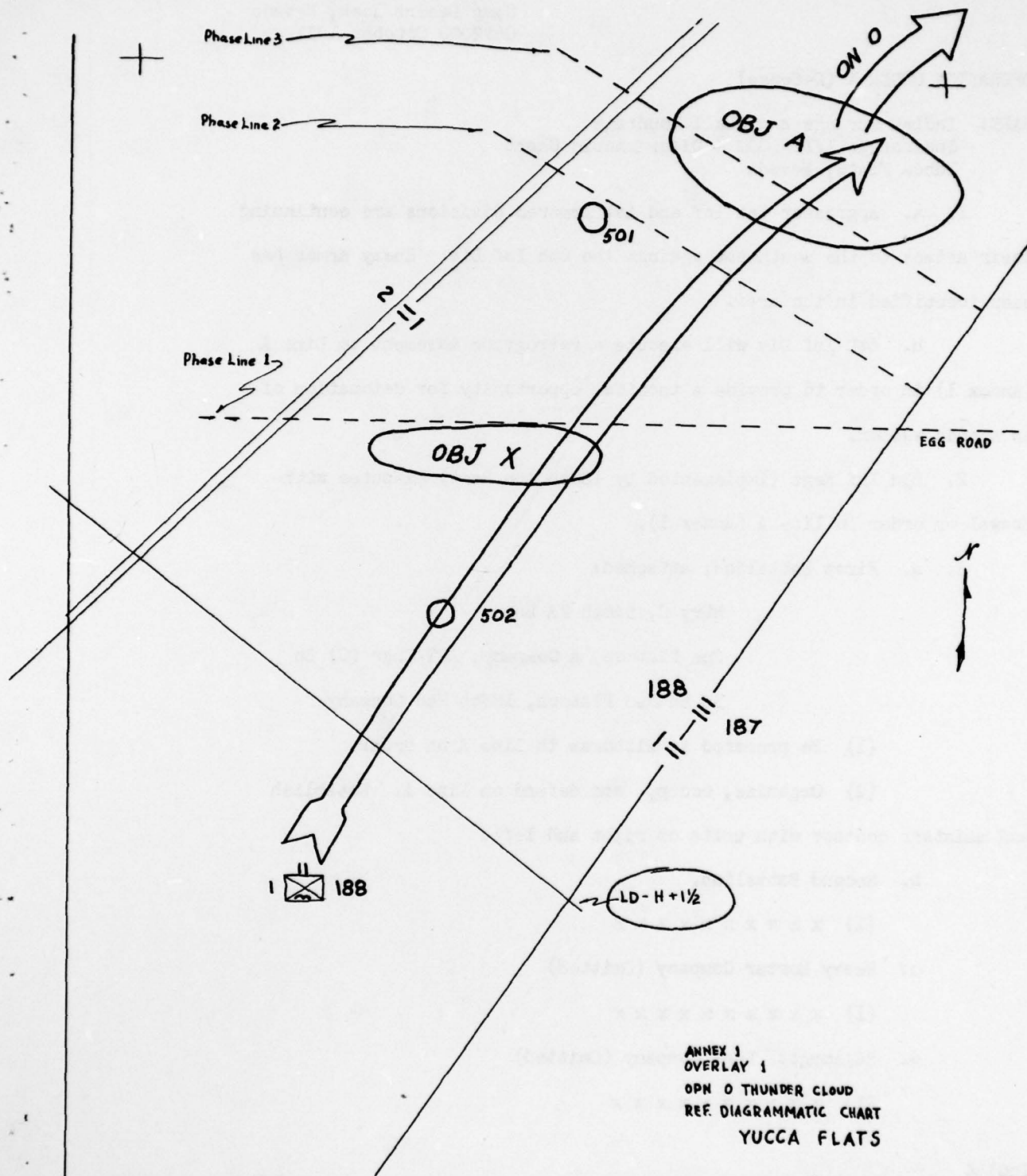
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ANNEX 1  
OVERLAY 1  
OPN O THUNDER CLOUD  
REF. DIAGRAMMATIC CHART  
YUCCA FLATS

Scale 1"=200 yards

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ATOMIC ENERGY ACT 1946

161st Inf Regt  
Camp Desert Rock, Nevada  
061200U October 1951

**OPERATION ORDER 1 (Defense)**

**MAPS:** Indian Springs and Skull Mountain  
Quadrangle 1/125,000 - Diagrammatic Chart  
Yucca Flats, Nevada

1. a. Aggressor 1st Inf and 1st Armored Divisions are continuing their attack to the southeast against the 6th Inf Div. Enemy armor has been identified in the area.

b. 6th Inf Div will execute a retrograde movement to Line A (Annex 1) in order to provide a tactical opportunity for detonation of an atomic weapon.

2. 63d Inf Regt (implemented by 188th Abn Regt) executes withdrawal on order to line A (Annex 1).

3. a. First Battalion; attached:

Btry C, 546th FA Bn

One Platoon, A Company, 127 Engr (C) Bn

3d Bn Med Platoon, 188th Med Company

(1) Be prepared to withdraw to line A on order.

(2) Organize, occupy, and defend on line A. Establish and maintain contact with units on right and left.

b. Second Battalion.

(1) x x x x x x x x x x

c. Heavy Mortar Company (Omitted)

(1) x x x x x x x x x x

d. Regimental Tank Company (Omitted)

(1) x x x x x x x x x x

Incl 4

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- e. Third Battalion.
  - (1) x x x x x x x x x
- x. (1) Complete defense positions will be prepared.
  - (2) All positions will be revetted with sandbags.
  - (3) Priority of work.
    - a. Individual and crew served weapon emplacements.
    - b. Fields of fire.
    - c. Protective wire.
    - d. Tactical wire.
  - (4) D Day, H Hour for atomic detonation to be announced.
  - (5) All commanders will exercise maximum security measures to effect complete surprise in the implementation of this Operation.
- 4. Administrative Order Number 1 remains in effect.
- 5. a. Regimental CP no change.
  - b. Current SSI and SOI in effect.

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Commanding

Annex: 1 Overlay

Distribution: A

OFL  
/s/  
S3

Incl 4<sup>2</sup>

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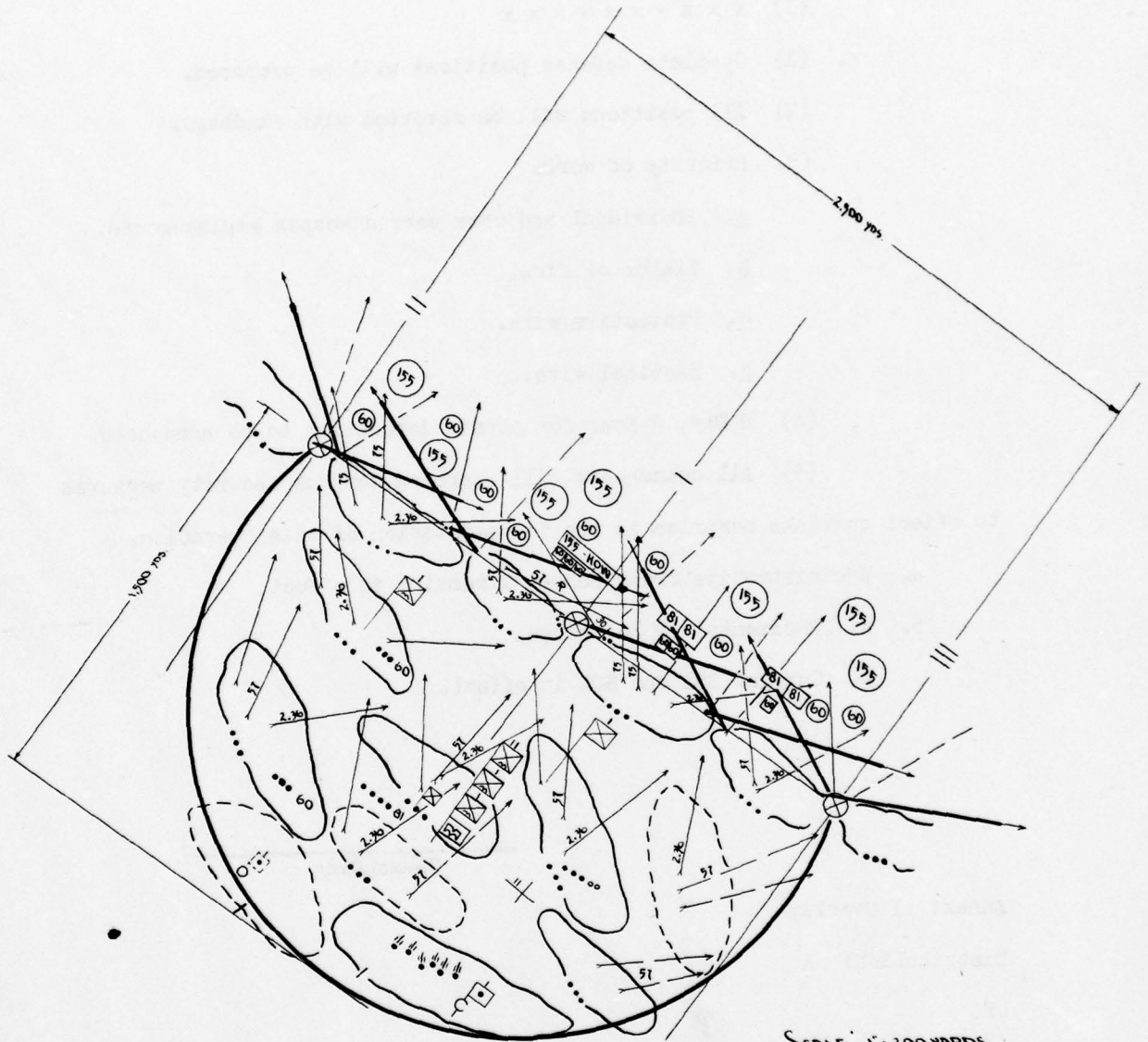
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RADIOLOGICAL SAFETY OPERATIONS

I. Pre - D Day Activities

a. Indoctrination of all personnel.

Under the direction of the AFSWP Radiological Safety Officer, Lt Col James Hartgering, attached to III Corps, all participating personnel were indoctrinated in the effects of nuclear explosions.

b. Training of Monitors

A cadre of three officers and twelve enlisted monitors reported from the Chemical Corps School, Fort McClellan, Alabama, on 16 October 1951. These monitors utilized the period prior to Exercise Thunder Cloud to train the forty-five monitors, organic to the 1st Battalion, 188th A/B Regiment, as well as fifteen additional monitors from the several service units participating in the exercise. Briefing in the plan of the exercise followed by on the ground rehearsal completed the training period.

c. Decontamination Plan

An officer proficient in decontamination procedures reported from the Chemical Section, Headquarters Sixth Army, on 15 October 1951. Eight men were indoctrinated and trained in personnel and equipment monitoring procedures and decontamination procedures. These personnel then established a decontamination station in the vicinity of the exercise location which they manned during the exercise as well as during rehearsals. Plans included the availability of a supply of clean clothing at the decontamination station.

d. A comprehensive plan for the issue and collection of individual film-badges was implemented by the Corps Surgeon. Due to the various categories of participating personnel, film-badges were issued to visiting observers at time of registry at camp; all other personnel received badges from a central location just prior to the exercise.

e. Calibration of Survey Instruments

All instruments used were the property of either the AFSWP or the AEC. Instrument personnel from these agencies conducted calibration checks and performed any repairs necessitated by rough handling.

f. Psychological Study

A team of specialists made a continuous study of the psychological reactions of participating troops throughout the exercise.

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g. AEC Monitors

Fifteen professional radiological monitors were supplied by the AEC as the technicians responsible for the safety of the troops participating in the exercise. These monitors physically accompanied the troops of the Battalion Combat Team throughout their maneuver in the area.

II. Activities on D-Day

a. Flash-blindness

At the time of the nuclear explosion, all personnel in the observer area faced away from ground zero to avoid temporary flash-blindness. An exception to this rule was made in those limited cases where 4.5 density glasses were distributed. Personnel wearing these glasses were permitted to observe the explosion and fire ball under the protection afforded by the glasses.

b. Radiation Safety

\* (1) The radiation safety limit was established as one roentgen total. To determine the safe limit of advance into the explosion area, an initial survey was performed by monitoring personnel to evaluate the overall residual radiation.

\* (2) The initial survey following the exercise explosion was conducted from helicopter by AEC monitors. Based on the findings made, two general surveys were conducted by monitors operating from 1/4 ton trucks. These ground surveys determined that all areas to and including Position 3 were completely free of radioactivity. Within an hour following the nuclear explosion, the one roentgen per hour line was determined to be at 350 yards from ground zero. Recordings made at H plus one hour are: Position 2, 10 mr/hr; Position 1, 20 mr/hr; 1000 yards from G.Z., 30 mr/hr; 750 yards from G.Z., 140 mr/hr; 500 yards from G.Z., 800 mr/hr; 350 yards from G.Z., 1000 mr/hr. Recordings made at H plus three hours are: 1000 yards from G.Z., 21 mr/hr; 750 yards from G.Z., 90 mr/hr; 500 yards from G.Z., 390 mr/hr; 250 yards from G.Z., 1000 mr/hr. From these figures it may be seen that at no time was the radiation intensity excessive and that the radiation decreased rapidly with time.

c. Monitors

In addition to the fifteen professional monitors furnished by the AEC, forty-five additional monitors, equipped with adequate radiac instruments, conducted repeated surveys throughout the areas under study and observation. No individual was permitted to enter an area where the radiation intensity was higher than one roentgen per hour.

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d. Test Positions

One monitor was assigned to each of the five equipment test positions and each of the three munitions test positions. These monitors surveyed the ground and all test items for residual radiation. No item was found to be significantly contaminated except an Engineer bulldozer. Some fragile items of fabric and rubber were either blown down and demolished by the explosive blast, or burned by the thermal radiation.

e. Film-badges

Film-badges were collected at Position 6 just prior to departure of personnel from the exercise area. The Film Badge Control Section, III Corps, was the agency which collected these badges and in turn submitted the badges to a Signal Corps Mobile Laboratory for processing. \*

f. Personnel Monitoring *DECON*

Just prior to entrucking to leave the exercise area, all personnel who went closer to ground zero than Position 2 were monitored for radioactive contamination. No one was found to be contaminated as heavily as 20 mr/hr, the tolerance limit. In case anyone had been contaminated more heavily, a decontamination center was set up where washing, bathing, and laundering facilities were available including a change of clean clothing. In addition arrangements were concluded with the AEC to process any contaminated vehicles through their vehicle decontamination station.

g. Medical Support

As a safety measure, a medical aid station was set up at Position 6 equipped with three ambulances. As soon as conditions permitted, two 1/4 ton field ambulances were dispatched to stations in the forward test areas. No casualties were treated at this aid station, either physical or psychological.

III. Conclusions

a. The results of Exercise Thunder Cloud conclusively proved that combat troops can safely cross the area of a nuclear explosion within minutes following the explosion. This is predicted on a condition wherein no one is exposed to radiation totaling over 1 roentgen.

b. This exercise demonstrated that durable items will safely withstand the blast and heat of a nuclear explosion without damage, whereas fragile, flammable items will generally ignite and be burned.

c. If the conditions of this exercise are duplicated, no personnel or vehicle decontamination problem is presented.

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ANNEX "A" TO RADIOLOGICAL SAFETY REPORT  
FOR EXERCISE DESERT ROCK

PERSONNEL DOSIMETRY

Purpose

To provide personnel dosimetry for all individuals who officially participated in Exercise DESERT ROCK in the area forward of the Atomic Energy Commission Control Point at Yucca Pass.

Operations

?

Conventional film badges were issued, through the Instrument and Film Badge Control Section of the Radiological Safety Unit, to all personnel officially participating in Exercise DESERT ROCK under III Corps cognizance. The exposed badges were collected after the field exercise and turned over to an Army Signal Corps photographic unit for processing. For purposes of this report, all participating personnel are arbitrarily divided into three groups, namely: Battalion Combat Team (BCT) troops, Official Observers, and III Corps Participating Personnel. Details of the operation are as follows:

\* 1. Type of film badge used - DuPont #553 conventional badges were carried by all participating personnel in the forward area. Each badge was enclosed in a sealed, clear, plastic envelope. Badge range: 0.1 - 250 roentgens.

2. Processing of film badges - Accomplished by qualified Army Signal Corps personnel using a mobile photo-laboratory truck located at the Nevada Test Site. Films were processed for 5 minutes at 68 degrees Fahrenheit using Kodak liquid dental x-ray developer, and their relative density read on an Ansco-Sweet photo-densitometer. Calibration of the type films employed was previously done with a Cobalt 60 source.

3. Issue and Collection of Badges:

- a. Battalion Combat Team - Badges were issued on D-1 at Camp Desert Rock, and collected after exposure on D-Day in the forward area prior to return to camp.
- b. Observers - Badges were issued by the III Corps Visitors' Bureau when the individual reported to Camp Desert Rock, and collected after exposure by the Bureau when the observers returned to camp.
- c. III Corps Personnel - Since this was a heterogeneous group, it was not feasible to have a central issue point. Some

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badges were issued on D-1, and others on D-day by muster in the forward area. After exposure the majority of the badges were collected at a designated check point in the forward area, and the remainder after return to camp.

4. Tabulation of Badges Worn and Radiation Levels indicated:

- a. BCT Troops - All men maneuvered through the test area to within 500 yards from ground zero by H+4 $\frac{1}{2}$  hours.

Badges worn: 883  
Badges reported: 863  
Percentage reported: 97.7%  
Maximum reading: 200 mr  
Minimum reading: 20 mr  
Average reading: 58.7 mr

- b. Observers - With exceptions as noted in the summary, none of this group proceeded closer than 1500 yards from ground zero.

Badges worn: 2796  
Badges reported: 2714  
Percentage reported: 97.2%  
Maximum reading: 320 mr  
Minimum reading: less than 20 mr  
Average reading: 31.4 mr (this includes only those readings of at least 20 mr which was for 87.2% of the total for this group)

- c. III Corps Participants - Operated throughout the test area as required by their particular duties.

Badges worn: 1587  
Badges reported: 1523  
Percentage reported: 96.6%  
Maximum reading: 225 mr  
Minimum reading: less than 20 mr  
Average reading: (not computed due to varied nature of this group)

SUMMARY

Personnel dosimetry film badge readings obtained throughout this test indicate that Exercise DESERT ROCK was an entirely safe field operation from the nuclear radiation hazard standpoint. All recorded radiation levels were well within militarily acceptable limits. The Signal Corps film badge processing unit proved to be completely adequate for



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this operation, and the badges used, although not entirely satisfactory, were acceptable for the purpose intended. The few readings obtained which were significantly above average from badges of the Observer Group are explained in that it has been established that the individuals concerned proceeded closer to ground zero than the remainder of the observer group. In operations where significant levels of radiations are encountered such unauthorized action might well have serious consequences. Personnel film badges and records will be kept on file in Headquarters, Armed Forces Special Weapons Project until further disposition is directed.

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ANNEX "B" TO RADIAC EQUIPMENT EVALUATION REPORT

1. The following is a tabulation of the radiac equipment used by the military participants in Exercise DESERT ROCK.

TYPE	ON HAND	TOTAL ISSUED	PURPOSE	SURVEY METER EVAL. REPORTS RECEIVED	FILM BADGES RECOVERED, PROCESSED, REPORTED.
AN/PDR-T1B	42	40	Area Survey	11	
AN/FDR-27	30	30	Area Survey	18	
MX-5	55	55	Personnel, Vehicle Decon. Area Survey	5	
IM-20/PD	27	27	Personnel Dosimetry & Position Instrumentation	25	
PH-656/PD	8	8	Position Instrumentation		8
DT-65/PD	16	16	Position Instrumentation		16
Dupont #553 in NBS Holder	126	125	Field Fortification Instrumentation		115
Dupont #553	9500	6446	Personnel Dosimetry Field Fortification Instrumentation		6093

2. Exercise DESERT ROCK permitted the first large scale utilization of radiac equipment by non-technical people, and therefore offered a particularly valuable opportunity for troop evaluation of the available radiac instruments. There were two "dry runs" for the exercise, and on these occasions personnel carried all their assigned instruments with the exception of the MX-5's. All instrument calibration and technical repair work was done by trained personnel as time and limitation of instruments prevented troop participation in this phase of the radiac problem. The following is a detailed break down of the employment of the radiac equipment listed under paragraph 1 above:

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Cont'd of Radiac Equipment Evaluation Report

<u>TYPE</u>	<u>No.</u>	<u>DETAILED EMPLOYMENT</u>
a. AN/PDR-T1B (Ion-Chamber Survey Meter) Range: 0-50r /hr	15	<u>AEC Radsafe Military Monitors for observers</u>
	9	BCT Augmentation Monitors from III Corps
	6	BCT Monitors
	1	BCT Augmentation Monitor from Cml C. School
	1	CG., III Corps' Personal Monitor
	1	III Corps Radsafe Officer
	1	III Corps Cml Officer
	1	V.I.P. (Congressmen) Group Monitor
	1	Pos 1. Photo Team Monitor
	1	Pos 1. Area Monitor
	1	Pos 7. Area Monitor
	1	Pos 8. Area Monitor
	1	Pos 9. Area Monitor
	<u>2</u>	Spares
TOTAL:	42	

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<u>TYPE</u>	<u>No.</u>	<u>DETAILED EMPLOYMENT</u>
b. AN/PDR-27 (G.M. Survey Meter) Range: 0-.5r/hr	20	BCT Monitors
	1	BCT Augmentation Monitor from Cml C. School
	1	Personnel Decontamination Team
	1	Vehicle Decontamination Team
	1	III Corps Cml Officer
	1	Film Badge Placing & Pick-up Team
	1	Pos 1. Area Monitoring
	1	Pos 2. Area Monitoring
	1	Pos 2. Photo Team Monitor
	1	Pos 3. Area Monitor
	<u>1</u>	Pos 4. Area Monitor
TOTAL:	30	
c. MX-5 (G.M. Survey Meter) Range: 0-.02r /hr	45	BCT Monitors
	1	III Corps Radsafe Officer
	1	Personnel Decontamination Team
	1	Vehicle Decontamination Team
	1	Film Badge Placing and Pick-up Team
	1	Pos 1. Area Monitoring
	1	Pos 2. Area Monitoring
	1	Pos 3. Area Monitoring
	1	Pos 3. Photo Team Monitor
	1	Pos 4. Area Monitor
	<u>1</u>	Pos 4. Photo Team Monitor
TOTAL:	55	

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<u>TYPE</u>	<u>No.</u>	<u>DETAILED EMPLOYMENT</u>
d. IM-20/PD (Quartz-Fiber Self-indicating Dosimeter) Range: 0-50r	6	III Corps Photo Team-Personnel Dosimetry
	2	Pos 1. Briefing O - Personal Dosimeters
	2	Pos 1. Briefing O - Emplacement Instr.
	2	Pos 2. Briefing O - Personal Dosimeters
	1	Pos 2. Briefing O - Emplacement Instr.
	1	Pos 3. Briefing O - Personal Dosimeter
	2	Pos 3. Briefing O - Emplacement Instr.
	1	BCT Area Briefing O - Personal Dosimeter
	2	BCT Area Briefing O - Emplacement Instr.
	1	CG., III Corps' - Personal Dosimeter
	1	III Corps Radsafe O - Personal Dosimeter
	1	C.O., Comd & Ctrl. Gp - Personal Dosimeter
	1	III Corps Engr - Personal Dosimeter
	1	III Corps O.I.C. Effects Tests - Personal Dosimeter
	1	III Corps Cml O - Personal Dosimeter
	1	O.I.C. Pos 7,8, & 9 Area Monitors - Personal Dosimeter
	<u>1</u>	Spare
TOTAL	27	

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<u>TYPE</u>	<u>No.</u>	<u>DETAILED EMPLOYMENT</u>
e. PH-656/PD (Polaroid Film Badge Holder)	4	Pos 1 - Emplacement Instrumentation
	4	Pos 2 - Emplacement Instrumentation
TOTAL:	8	
DT-65/PD Polaroid Film Plaque)	8	Pos 1 - Emplacement Instrumentation
Range: 10-403r	<u>8</u>	Pos 2 - Emplacement Instrumentation
TOTAL:	16	
f. Dupont #556 Film Badges in NBS Holders	10	Pos 1 - Vehicle Instrumentation
Range: 10-2000r	81	Pos 1 - Emplacement Instrumentation
	8	Pos 2 - Vehicle Instrumentation
	10	Pos 2 - Emplacement Instrumentation
	8	Pos 3 - Vehicle Instrumentation
	<u>8</u>	Pos 3 - Emplacement Instrumentation
TOTAL:	125	

g. Dupont #553  
Film Badges  
in Clear Plastic  
Envelopes  
Range: .1-250r

2797 Observers - Personnel Dosimetry *See p 111*

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1636 Service Participants - Personnel Dosimetry *See p 111*

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889 BCT Troops-Personnel Dosimetry *See p 111*

823 Left in place on BCT Troops Rifles

126 Left in place on BCT Troops other Equip.

76 Pos 2. Emplacement Instrumentation

8 Pos 2. Vehicle Instrumentation

67 Pos 3. Emplacement Instrumentation

4 Pos 3. Vehicle Instrumentation

4 Pos 4. Emplacement Instrumentation

4 Pos 4. Vehicle Instrumentation

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Cont'd of Radiac Equipment Evaluation Report

<u>TYPE</u>	<u>No.</u>	<u>DETAILED EMPLOYMENT</u>
g. Cont'd	8	Pos 5. Emplacement Instrumentation
	<u>4</u>	Pos 5. Vehicle Instrumentation
TOTAL:	6446	

*Training monitors*

3. On 16 Oct 1951 at Camp Desert Rock approximately 30 of the proposed III Corps CBR personnel received a two-hour familiarization course in which they were instructed in the purposes and uses of different types of radiac devices. After being shown how to operate the instruments all were afforded the opportunity to handle and become familiar with the instruments they would later use in this exercise. On 17 October 1951, approximately 40 of the proposed 11th Air Borne units' CBR personnel received the same two hour familiarization course at Camp Desert Rock. In addition, instruction in the proper uses of radiac instruments was continued after the above dates until D-Day by 15 representatives of the Cml C School and by the CBR Officer of the 1st Bn., 188th AIR, at Camp Desert Rock.

4. The following number of comments pertaining to each of the survey-type instruments were obtained from the reports received from using personnel:

a. <u>AN/PDR-T1B</u>	<u>No.</u>	<u>ION CHAMBER SURVEY METER (0-50r/hr)</u>
	8	Too large and bulky for field use
	11	Too heavy for field use
	4	Too slow warming up and stabilizing
	4	Erratic meter needle swing on switching range scales
	8	Unsatisfactory shoulder strap arrangement
	3	Not rugged enough for field use
	2	Unnecessarily complicated for field troops use
	1	Not high enough range
	1	Instrument reading affected by directionality.

Opinions gathered from written reports and verbal surveys indicate that the AN/PDR-T1B is too large, bulky and heavy for field troops use, and that the shoulder strap carrying arrangement is unsatisfactory. Many monitors expressed the opinions that for military field use a small, light weight, wide-range, beta-gamma survey instrument, such as the AN/PDR-32, is needed in the field.

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Cont'd of Radiac Equipment Evaluation Report

b. AN/PDR- 27	<u>No.</u>	<u>G.M. SURVEY METER - (0-500 mr/hr)</u>
	13	Too large and bulky for field use
	16	Too heavy for field use
	6	Not rugged enough for field use
	18	Very poor catches for carrying strap arrangement and straps too bulky and complicated
	8	Beta shield and beta window protective grid unsatisfactory
	5	Not weatherproof
	8	Too low range
	2	Poor Probe cable arrangement
	3	Should use standard phone plug & jack
	9	Poor meter illumination
	3	Should use small ear phones which can be used where helmet is worn
	1	Should use fewer and all JAN-Spec batteries

Opinions gathered from written reports and verbal surveys indicate that the AN/PDR-27 is too large, bulky and heavy for field troop use, and that the carrying strap, as well as the strap attachment mechanism, is very unsatisfactory. Further, several users expressed the belief that the beta shield and beta window protective grid were unsatisfactory. The instrument is too low range, and the meter illumination is poor. Although it was agreed that a beta-gamma measuring instrument is useful in the field, a small, light weight beta-indicating-gamma measuring meter is definitely required.

c. MX-5-G.M. Counter - (0-20mr/hr)

<u>No.</u>	<u>G. M. COUNTER - (0-20mr/hr)</u>
3	Too low range
1	Too heavy

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Since the MX-5 instruments were used for personnel and vehicle monitoring primarily, and too few evaluation reports were received, no further comments are justified since this meter is not a militarily designed instrument.

5. Twenty-two IM-20/PD quartz fiber, self-indicating, pen-type dosimeters (O-50r) were issued to key personnel as personal dosimeters on D-Day. The remaining 5 were placed near the fronts of each position by the on-site briefing officers the day before D-Day to give a quick check on the amount of prompt (90 sec) gamma radiation received at each position due to the nuclear detonation. It was noted that some of these personnel dosimeters tended to discharge to and indicated reading of 1 roentgen, probably due to insulator "soak-in", prior to usage. However, the readings taken by the wearers after leaving the test area were, for all practical purposes, too low to give a satisfactory comparison with the dosage reading on their personal conventional film badges. On the other hand, readings taken from those IM-20/PD's placed in positions by the briefers agreed within 9 to 20% of the conventional film badge readings taken from the badges used to instrument the same emplacements.

6. Four PH-656/PD holders - with two DT-65/PD quick-processing self-indicating film plaques (10-403r) per holder- were placed on the surface near the fronts of both Positions 1 & 2 by the on-site briefing officers the night before D-Day to obtain a quick check of prompt gamma radiation similar to the method mentioned above in paragraph 5. These film badges were collected within one hour after the detonation and processed on-the-spot by a qualified Sig C Officer. The readings taken from these film plaques agreed to within approximately 20% of those indicated by the conventional film badges used to instrument the same emplacements at Positions 1 & 2.

7. All conventional film badges of the DuPont #556 and #553 types used for this operation were processed, calibrated, read, and recorded by qualified Signal Corps personnel at the test site C.P. area as soon as practical after their exposure.

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Headquarters III Corps  
Fort MacArthur, California  
29 November 1951

Obligation of funds for Exercise Desert Rock to include 25 November 1951. It is not anticipated that these figures will materially increase when the final report is received.

SECTION A

Obligation for transportation charges on materials shipped to Desert Rock. 95,844.22

SECTION B

Army Shipping Documents (10% for packing and hauling) from Sacramento Signal Depot for shipment to Desert Rock. 3,600.49

SECTION C

Purchase Requests. 80,845.20

SECTION D

Miscellaneous. 71,589.26

SECTION E

Obligations for Travel\* 259,514.58

SECTION F

01 Funds for Personal Services 655.31  
512,049.06

\* Estimated total of \$486,000.00 for transportation of observers.

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MEDICAL AND PSYCHOLOGICAL REPORT ON OPERATION THUNDERCLOUD

In attempting to assess the psychological effects of the weapon upon the troops, one is inevitably drawn to the conclusion that the results, though measurable, were highly indeterminate and unconvincing. The limitations of evaluation were the limitations inherent in the problem. Handicapped by a preconceived notion that there would be no reaction, it took on the form of a gigantic experiment whose results were already known. No well controlled studies could be undertaken which could presume even superficial validity. Other factors, too, contributed toward the difficulty of the evaluation; the monotony and isolation of the long stay on the desert in a drab environment, with irritating wind, dust and sand, the restrictions to the camp necessarily imposed by the nature of the problem, the postponements and delays, and the impatience of the soldier to get out of Nevada. Added to this was the fact that the combat troops represented a regular unit of volunteers with strong ties of identification and mutual dependence within their structure, with specialized training, high unit morale, pride and bravado to motivate them. But perhaps it proved everything in demonstrating that intensive indoctrination and orientation by the best instructors in the business, thorough planning, careful rehearsal, and every precaution taken to insure peacetime safety are the bases for building up a reasonable philosophy toward the bomb.

Then, to attempt to probe into men's private fears and anxieties when all danger of death, injury or mutilation has been excluded by the exercise, seemed superfluous to the problem. What we saw and heard were only the facets that men turn toward you in the presence of a huge spectacle, mysterious and only partly understood. Likewise, the psychological evaluators, of whom there were many and various, were perhaps too obvious and eager. This is an era of polls and questionnaires and here was a new and untried field with unlimited possibilities. The ultimate response, finally, was a humorous and deliberate program in the troops to confuse the psychological people with fictitious reactions.

Measured against this background, are these observations. There was some fear and anxiety which may be considered normal in the face of danger, real or imaginary. There was an inner tension and apprehension during the ominous silence preceding the drop. Some said that they were a little scared, others admitted that they were nervous, many sent up a small prayer for the accuracy of the bombardier. There was a sharp reaction to the blinding flash of light, and, upon turning, all sat transfixed upon the fantastic and beautiful spectacle, unfolding supernaturally in grim and predictable sequence; cataclysm, by the numbers. The impact of the blast and heat wave sent a rise of tension through the men, climaxed by the sharp crack of the detonation. When the second crack followed, there was a definite reaction of fear of an unscheduled effect. Then a period of relaxation and recovery while following the sinister mushroom cloud in its ascent. Nothing happened. There was no panic, no hysteria, no flight, no confusion, no evidence in actions or features of any residual fear. There was no exhilaration, little expressed enthusiasm, but all had been terribly impressed with the malignant potential of this ultimate

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in instruments of death and destruction. All behaved well and it was a calm and realistic reaction, almost fatalistic; accepted as just another part of their experience. For the average American soldier is undemonstrative and inarticulate as regards his emotional reactions and is apt to display a remarkable lack of interest in all that concerns war.

During the march to the simulated attack, there was a surprising absence of spontaneous comment on what they had seen, mostly the irrelevant and routine conversation and small talk which attend all marches. When asked whether they would have been willing to stay in their defensive positions during the shot, after looking over the effects upon their equipment and the apparently undamaged animals, most of the men agreed that they would; but added that their feeling of security would have been seriously questionable. There was unanimous amazement at the minimal degree of destruction of their equipment in the advance areas and at the paradoxical survival of the sheep. The sight of these animals walking around essentially intact, was a most impressive and eloquent demonstration of the key to survival, the foxhole. It spoke volumes for an added confidence which comes with increased knowledge and understanding. This is the fact of greatest importance in tactical employment; if, at the same time, one bears in mind that, under all circumstances, this weapon has a lethal radius of one half mile for all living things from any or all of its three potential forces, and that it has the added proclivity of throwing buildings through the air with devastating accuracy. While gaining confidence there is danger in trying to over simplify or sell this weapon short.

There were comments on the scorched grass and burning yucca. There was a feeling among some that they were being used as guinea pigs and if the Army knew what the effects would be, why were they being used to prove it. There was some skepticism after the first unspectacular shots that the bomb was overrated and this was not entirely dispelled when the forward areas were inspected for damage. There was discussion that realism was removed from the maneuver when the columns had to halt to let busloads of observers pass ahead of them to the forward positions, but this was unavoidable in the timing and the mechanics of the exercise. There were comments that the problem had been emasculated too severely for peacetime safety and that the presence of many monitors put too much questionable emphasis on security. However, there was, in spite of all the inconsistencies, a universal feeling of pride, an unexpressed sense of history, in participating as pioneers in unique and exclusive maneuvers which would be important in the development of military doctrine. This colored their behavior and supported their psychological reactions.

Medically, the observations are important to substantiate objectively the validity of the conclusions reached. Provisions were made for possible casualties in the problem by the establishment of an aid station at the observation post. Ambojeeps were stationed at the two most advanced corners of the forward area after the drop. Plans were also made for mass evacuation of personnel. There were no casualties admitted to

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the aid station and no neuropsychiatric casualties. There were no cases of flash blindness because of the precaution taken to face all personnel away from the explosion for three seconds. Primary shock was felt but all were sitting down and no harmful results were observed. The same was true for secondary shock in the absence of effects from flying objects and broken vehicle windshields. None expressed any particular concern about the possibility of impotency or sterility. There were no flash or flame burns; and radiation, both prompt and delayed, was not a factor because of the distance from ground zero. Residual radiation on fragments of the tower from shot Able caused no harm, after repeated cautioning not to pick up souvenirs. Induced radiation received by personnel was not significant. It varied from 250 mr at 500 yards from ground zero to background readings (.1 mr). Film badges revealed a variation from a maximum of 200 mr to a minimum of 20 mr; with an average of 58.7 mr. The observer group showed an average of only 21.4 mr. The combat troops developed only background readings when monitored leaving the forward area, and no decontaminating procedure was necessary. Provisions were made to brush the dust from clothing, and gas masks were carried to avoid heavy dust concentration but they were not used. Food was consumed in the forward area and there was no internal radiation hazard. Smoking was permitted. Water tested in the forward positions showed only background readings and well within limits of safety. Blood specimens were taken from the 18 sheep utilized as test animals, on D day minus two, D day minus one, and D day plus two hours. A comparative analysis reveals no significant variation which could be interpreted as radiation effect upon the white blood cell counts. To recapitulate, there were no significant effects upon the personnel from the atom bomb.

Observations were also made in the dispensaries at Camp Desert Rock relative to neuropsychiatric admissions before and after the maneuver, and to cases with psychosomatic components. There was apparently no relationship which could be attributable to the bomb. Interviews with personnel on the days succeeding the maneuver revealed no residual fear or anxiety reactions and, witnessing shot Easy, following the maneuver shot, brought forth only routine comments. There were no NP casualties evacuated from Camp Desert Rock as a result of the maneuver.

It would be impossible to draw any significant conclusions from the maneuver relative to medical logistics. No change in number or composition of medical units for augmentation is visualized. In the event of an atomic disaster, on the other hand, the problem becomes enormous and not within the province of this exercise.

In summary, the evaluation of the medical and psychological aspects of the maneuver may well be answered by a question, namely, how good was the planning and the indoctrination on the atom bomb. It approached perfection in planning and accomplishment and therefore our results were of the inverse proportion. It may well be the most important thing that was learned; that widespread and thorough indoctrination and orientation, careful planning and strong leadership, together with the cumulative experience gained from exercises of this type, will result in a reasonable

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and objective attitude toward the weapon and its tactical employment. And, if any conclusion can be drawn from the observations, it may make all the difference in the world in the incidence of neuropsychiatric casualties. This is believed to be true, although well aware of the tremendous psychological problem under uncontrolled wartime conditions.

It was a memorable experience for the men and, while retaining a profound respect for the weapon, much of the superstition and mystery surrounding radiation was removed and they gained in confidence and reassurance. They were left with the conviction that the area could be safely entered after the explosion, that effects decrease rapidly with distance; and most important of all, the life saving protection of a hole in the ground, at any distance. It was further learned that permissible war time dosages of radiation could be assumed in larger readings as a calculated risk, in line with the other known hazards of war. Degrees of violence in war are relative and can be endured, like stress, with knowledge and conditioning. Remove the mystery and deemphasize the hazard radiologically and the thing is accepted in its proper proportion without unreasoning fear.

The combat troops were observed as they fell in, mounted their trucks and moved into their positions. Later one of the fifteen attacking columns was accompanied to the objective, 500 yards from ground zero; the impression was gained that it would be no different in combat after the initial shock had been experienced, and that they would take the thing in stride, capitalize on surprise, and accomplish their mission as if nothing more than an artillery barrage had preceded it. It was an expression of their training. It is felt that a few brave platoon leaders would have walked ahead of their men, with fortitude, to carry the attack to the enemy just as they always have, before the advent of this gigantic piece of ordnance, or any other more violent which may be conceived.

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EFFECTS ON MATERIEL

As described in a previous section of this report, various items of military equipment and materiel were placed at different distances from ground zero in order that the damage as a function of distance could be ascertained. The results of this field test are described below. It is emphasized, however, that such results are unique as they apply only to the particular nuclear explosion from which they were obtained, and under the then existing atmospheric, terrain and other conditions at the test. Consequently, generalizations or extrapolations from these test results and data should not be made without adequate corroborative evidence. Moreover, the damage assessment was made under field conditions, during a five hour period following the explosion, and utilizing only field testing equipment normally available to technical services at corps level.

1. Damage as a function of distance from ground zero.

a. 1000 yards nominal distance.

(1) Animals were protected from direct effects; one sheep was in a section of standard communication trench, while the other was placed in a concrete machine gun emplacement. The former sheep was apparently undamaged; the latter escaped from the machine gun emplacement after the explosion (the wooden door was blown in) and was found standing near the test position when evaluators arrived at H + 45 minutes. A slight singe of wool was formed over this sheep's shoulders.

(2) Equipment was found to be largely combat serviceable; 81% of the 123 separate items of equipment and materiel were fit for immediate combat use. Serviceable items included a 1/4 ton truck, various types of tanks, Bailey bridges, a D-7 bulldozer, all weapons, all radios, and telephones both above and below ground not in tanks, rations and numerous other items normally found in forward combat areas. A detailed tabulation of equipment and materiel, which indicates the damage sustained by each item in terms of combat serviceability versus non-combat serviceability is attached as Annex 1. Principle items suffering damage were those of combustible material which were above ground, such as cloth and clothing; small items above ground, such as boots, grenade launchers, compasses, etc., which were displaced over appreciable (50-100 ft) distances by blast and covered by 6"-18" of dust and dirt; and overhead communication wires strung on 30 foot poles, which were tangled and broken by the blast.

(3) Field fortifications, including all representative types shown in FM 5-15 together with two specially

  
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designed emplacements, were substantially undamaged. Wood of the emplacement revetments (consisting of 1" dimension lumber braced with 2" x 4" struts), where exposed to direct thermal radiation, was charred but did not burn and apparently suffered no structural damage from such charring. Exterior layers of sandbags exposed to blast and heat both burned and burst. Other structural damage was slight: an unrevetted fox hole caved in partially, filling to 1/4 of its depth; overhead cover on two fox holes and an observation post, consisting of 4" x 4" lumber covered with sandbags, was jarred out of position as much as one foot. Thermal indicators placed in selected emplacements demonstrated that neither white nylon cloth nor C.D. duck cloth would burn or char if so protected.

(4) Ammunition was largely unharmed at this distance, with 82% of the 85 separate items found to be fully combat serviceable. Chemical munitions, consisting of various hand grenades, sustained a higher damage rate; four out of 12 items ignited, apparently owing to thermal radiation entering the grenade through perforations. Unserviceable items were rendered so because of scorching, propellant powder burning, powder train in 105 mm howitzer round burning, and disappearance of small items in the blast. Of the 24 AT and AP mines tested, only two AP mines detonated and these owing to movement of the mines to which trip wires were attached. A few of the surface laid AT mines were displaced by the blast up to 15 feet from their original position, but did not detonate. Buried mines were unaffected. The three-strand barbed wire minefield fence, using commercial-type steel pickets, was blown down on the ground by the blast. A tabulation of all munitions tested at this distance may be found in Annex 1, with the equipment tabulation referred to above.

b. 1500 yards nominal distance.

(1) Animals at this position were both protected and unprotected from explosion effects. The two unprotected sheep, placed in wire mesh cages on the ground surface had their wool on the back of their necks and on their faces well scorched. One sheep has his right eye swollen and lacrymating, although sight was apparently undamaged. Both sheep sustained some first degree burns on their ears. Of the two sheep placed below ground, one was apparently unharmed, while the other (from the concrete machine gun pill box) had a slight singe of wool over the crop. This latter sheep escaped from his pen after the blast, and was found docilely standing near the test position with the escaped sheep from position one (1000 yards) described previously.

(2) Less damage to equipment was noted than at the 1000 yard distance; of 157 items from six different

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technical services, 86% were discovered to be combat serviceable. All weapons were fully operable although dusty and gritty. A water purification and supply point, containing three 3000 gallon water tanks (1/4 full, half full and full of water) was serviceable, and the water was found free of radiological contamination after subsequent laboratory testing. All tanks, vehicles and Bailey bridge were serviceable, although vehicle canvas received blast and thermal damage. Radios, telephones and switchboards were operational. As to the 1000 yards position, however, cloth items were scorched (to a lesser degree) and small items were tossed about by the blast. A command post tent was completely demolished and largely burned; its poles were broken and shattered. An engineer transit in its carrying case and a QM field range were knocked over but functionally unharmed.


(3) Field fortifications were all entirely functional after the explosion, suffering little or no damage. Sand bags were scorched but serviceable; wood charred to some extent, where exposed to direct thermal radiation, but was structurally unharmed. A few minor structural failures were noted, such as a one inch revetment board tearing loose and some minor bowing of revetment walls. Nylon and cotton thermal indicators were unharmed in the emplacements, although damaged above ground in front of the emplacements.

(4) Less damage was sustained by ammunition than at the 1000 yard distance, with 87% of the 85 items found serviceable. The only damage noted was to mortar shell propellant charges, which burned, a small firing device which was blown away by blast, two AP mines, with trip wires which detonated, and some chemical grenades which ignited through the emission holes. No other mines nor protective wire were displaced by the blast.

c. 2500 yards nominal distance.

(1) Of the four sheep at this position, two were above ground in wire pens while two were below ground in a pit and a concrete machine gun pillbox. The two exposed animals suffered singed wool on the side, back of neck, and rump; the sheep in the pit was very slightly singed on the back of its neck; the fourth sheep escaped from the pillbox and was not recovered.

(2) Equipment was damaged proportionally less at this position, with 93% of 147 items combat serviceable after the explosion. A canvas 3000 gallon water tank which had waterproofing compound applied caught fire and burned completely, although the remaining two rubber tanks were unscathed and enabled the water purification unit to operate. A Command Post tent, as at the 1500 yard position, was demolished; the

  
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the glass globe on a gasoline lantern was broken; and a rocket mask was charred to unserviceability. Also as at the previous two positions, signal wire lines strung on 30 foot poles were scorched and twisted into a non-operational condition. All other items were in serviceable condition.

(3) Field fortifications, of the same number and type as at the 1000 and 1500 yard positions, were lightly charred on exposed wood, and sandbags were somewhat scorched. No functional or structural failures, however, were observed.

(4) Still less damage than at closer positions was sustained by ammunition; 93% of the items were combat serviceable. One AP mine with trip wire exploded, and some mortar (60 mm, 81 mm, and 4.2") propellants bags burned. No other damage was detected.

d. 3500 yards nominal distance.

(1) Two exposed sheep at this position had very slight scorching of wool on back and one side. They were otherwise unharmed. Two animals in fox holes, at somewhat greater distance from ground zero in the BCT position, were entirely unharmed.

(2) Equipment was entirely combat serviceable, with canvas suffering very light scorching at some seams. Weapons and other equipment in the BCT position were undamaged.

(3) Emplacements and tactical wire in the BCT position, with distance from ground zero ranging from 3500 to 5000 yards, were undamaged. Such emplacements were in some cases revetted with sandbags, but were largely free of revetment.

(4) No ammunition was tested at this or greater distances from ground zero.

e. 7000 yards nominal distance.

(1) Sheep, of which two were above ground and two below, suffered no damage at this distance.

(2) The only equipment item tested was an L-5 airplane placed side-onto the blast. It sustained very light damage: dope was cracked in small scattered areas on exposed side; a small hole was broken in one window, and a four inch crack was noted in the top forward plexiglass; inspection hole covers on empennage were blown out; and a panel cover from wiring box in lower right corner of front cockpit was jarred loose. The aircraft was entirely serviceable, and was flown 30 miles six hours after the explosion.

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2. Damage - sensitive items. In general, damage was sustained by those items which were relatively heat sensitive, although some equipment was rendered non-serviceable owing to blast. No equipment or materiel suffered residual radiological contamination. Outstanding damage sensitive items were tents, clothing, and other fabrics unprotected by shielding; overhead signal wire lines; tank radios; unguyed telephone poles; sniper scopes and sandbags at 1000 yards; and very small items which were lost. A tabulation of damage - sensitive items, grouped by technical service supply the items, follows. Almost all items were exposed to explosion effects, unprotected by emplacements.

Supply Service	Item	Distance fm GZ yds	Damage
Chemical	Dust respirators	1000-1500	Severe burning
	Gas masks	1000-1500	Severe burning
Engineer	Sniperscope	1000	Flickering image
	Lensatic compass	1000-1500	Buried and lost
	3000 gal water tank	1500	Stave seams ripped
	Sandbags	1000	Burst and charred
Medical	None	-----	-----
Quartermaster	Rocket mask	1000,1500	Cloth burned
	Wire carrier M1938	2500	
	Wire carrier M1938	1000	Burned
	Parka overcoat	1000,1500	Torn and burned
	Helmet liner	1000	Webbing burned
	Shoe pac M1944	1000	Seams ripped
	Cotton shirt	1000,1500	Torn and burned
	Wool shirt	1000,1500	Torn and burned
	Cotton trousers	1000,1500	Torn and burned
	Wool trousers	1000,1500	Torn and burned
CP tent M1942	1500,2500	Torn and burned	
Folding camp table	1500	Completely torn apart	
	Gasoline lattern	1500,2500	Globe shattered
Ordnance	Binoculars M13A1	1000	Lost
	Wrist Watch, Elgin	1500	Balance staff broken
Signal	Reel unit C-11	1000	Carrying straps burned
	Radio SCR 528 in tank	1000	Transmitter fails to load
	Radio SCR 528 in tank	1000	Trans power supply out
	Radio SCR 508 in tank	1000	Trans failed to load
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			Trans failed to load

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Supply Service cont	Item cont	Distance fm GZ yds	Damage cont
Signal	Telephone pole, 30 ft	1000	Broken off at ground
	Wire on poles, various types	1000, 1500, 2500	Twisted and burned

3. Summary of damage causative factors. a. Blast effect varied from severe at 1000 yards - sufficient to rip sandbags and toss them four or five feet and move a bulldozer 9 inches - to light at 4500 yards, where a pup tent was flattened.

b. Thermal effects were likewise severe at 1000 yards, burning exposed cloth and charring wood. Such heat effects dissipated to military insignificance at 3500 yards.

c. Nuclear radiation is believed to have been injurious to unprotected humans at 1000 yards. No residual contamination of equipment was found. The radiation level had dropped to a very small fraction of one roentgen by H / 45 minutes at 1000 yards, and decreased to zero in a few hours.

4. Summary of ammunition firing results. a. All serviceable ammunition from 30 caliber to 155 mm how was tested at targets on D / 1.

b. No abnormalities of any sort were found.

5. Conclusions applying to this test. a. Based on the condition of test animals, it is possible that humans would have been free from serious physical harm in emplacements at distances greater than 1000 yards from ground zero. The indication revealed by the sheep, however, is presently inconclusive and requires corroborative evidence and further testing to establish its validity.

b. Combat operations would not have been materially hampered owing to equipment, materiel, ammunition or fortification damage up to a distance of 1000 yards from ground zero.

c. Ammunition which is not damaged by a nuclear explosion of this magnitude and character will function normally.

d. Residual radiological contamination from a nuclear explosion of this magnitude and character is of no military significance at distances greater than 1000 yards from ground zero.

e. Present field fortifications, described in FM 5-15, are adequate at distances of 1000 yards or more from ground zero to serve their intended purpose after exposure to a nuclear explosion of this magnitude and character. 131

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f. Further tests are required to:

(1) Corroborate and validate the findings and conclusions presented herein.

(2) Determine damage effects to military equipment, materiel and ammunition for nuclear explosions of different magnitudes and character.

g. No change in present combat logistical doctrine is warranted based on the results of this particular test.

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EFFECTS ON BCT POSITION

1. In order to assess the effect of the nuclear explosion on the BCT personnel and equipment, certain typical installations were selected for study. The number of installations to be studied was limited by the time schedule imposed in the operational plan. However, it is believed that adequate coverage of the BCT is provided in the following table:

The following tabulation shows the emplacements and installations selected for photographing and study together with the post shot comments:

<u>Item or Emplacement</u>	<u>Description of Post Shot Condition</u>
Bn CP Tent	No damage
Bn Switchboard	No damage - wires O.K.
Bn Radio	No damage
Bn Hq Co CP	Light weight test model octagonal tent ripped.
Bn vehicles (1/4 ton)	No damage - faint evidence of paint scorched.
Bn Aid Station	No damage
155 MM Howitzer	Gun - no noticeable damage. Aiming stakes knocked down. Light debris scattered around.
75 MM Recoilless Rifle	No damage
57 MM Recoilless Rifle	No damage
81 MM Mortar	No damage to gun. Aiming stake down
Cal. 30 HMG	Gun O.K. Sandbags scorched
Fox Hole - with fatigues above ground	Burlap camouflage garnishing ignited and dropped into fox hole. Secondary fire burned rifle stock.
3.5 Rocket Launcher	No damage
Sheep - below ground in fox holes	No damage or injury

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<u>Item or Emplacement (cont)</u>	<u>Description of Post Shot Condition (cont)</u>
Sheep - above ground in wire pens	Sheep #4AA - wool scorched on left side. Sheep #4DD - Wool singed around face. Skin around eyes and mouth burned.
Pup Tent - erected with weighted dummy inside	Pup tent pole broken. Tent collapsed on dummy. Dummy was not moved.

2. The emplacements, both revetted and unrevetted, in the entire BCT area were undamaged except for scorching on the sandbags in the forward positions, two cases of fires starting in camouflage garnishing over fox holes which resulted in secondary fire damage to two rifle stocks.

3. In summary, the BCT would be 100% effective after the nuclear explosion, provided they were forewarned and took advantage of the protection afforded by their emplacements. Actually, adequate protection would be provided at this position merely by providing protection against thermal radiation. (This was demonstrated by the pup tent experiment.)

4. Based on observed thermal burn on exposed sheep and scorching of paint and sandbags, it is felt that serious (about 30-50%) casualties would occur among exposed and unwarned troops at this position.

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CAMP DESERT ROCK, NEVADA  
SIGNAL SECTION, III CORPS  
DOG DAY SHOT

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TEST POSITION #1

1000 Yds from Ground Zero

1 November 1951

I. Open Wire Pole Line.

- a. (1) All poles burned on the side toward blast.  
(2) All poles badly checked.
- b. Number one (1) pole, guyed three ways, settled slightly.
- c. Number two (2) pole, unguyed, was broken off 3 feet above the ground. The top of the pole was laying on the ground pointing away from ground zero. The stub of the pole was shifted 8 inches at the base and away from the blast.
- d. Number three (3) pole, single guy toward ground zero, shifted at base one (1) inch toward blast.
- e. Number four (4) pole guyed four (4) ways, no noticeable movement however, #10 insulator on outer cross arm missing and pin broken off.
- f. All wire leads were down.
- g. Wire WD-1/TT
  - (1) Broken in several places.
  - (2) Insulation missing from large portion of wire.
  - (3) Remaining insulation melted and fused.
- h. Wire W-143
  - (1) Broken in two (2) places.
  - (2) Fabric insulation charred and burned.
  - (3) Rubber insulation slightly scorched.
- i. Wire W-110
  - (1) Broken in two (2) places.
  - (2) Fabric insulation charred and burned.
  - (3) Rubber insulation slightly scorched and fused.
- j. Spiral 4, CC358
  - (1) Broken in two (2) places.
  - (2) Rubber sheath melted slightly.
  - (3) Inside rubber wrappings OK.
- k. Spiral 4, WF-7/G
  - (1) Broken in two (2) places.
  - (2) Plastic sheath melted and ran slightly.
  - (3) Inside plastic wrappings OK.

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- l. Wire, Iron W-76  
(1) Broken, but no other damage.
- m. Wire, Copper W-74  
(1) Broken.  
(2) Slight oxidation otherwise OK.

II. Surface Layed Wire Lines.

- a. All wire lines displaced, away from blast, to limit of free slack.
- b. All wire lines broken and melted off at TM-134 at foxhole J.
- c. Wire WD-1/TT  
(1) Broken.  
(2) Insulation missing from large portion of wire.  
(3) Remaining insulation melted and fused.
- d. Wire W-143  
(1) Broken.  
(2) Fabric insulation charred and burned.  
(3) Rubber insulation slightly scorched.
- e. Wire W-110  
(1) Broken.  
(2) Fabric insulation charred and burned.  
(3) Rubber insulation slightly scorched and fused.
- f. Spiral 4, CC-358  
(1) Broken.  
(2) Rubber sheath melted slightly.  
(3) Inside rubber wrappings OK.
- g. Coils, C-114  
(1) No noticeable damage.
- h. Wire, WD-1/TT, in dispenser  
(1) Unit below ground undamaged and serviceable.  
(2) Unit above ground:
  - (a) Unit displaced thirteen (13) ft three (3) inches away from blast.
  - (b) Portion of canvas case facing blast burned and blown away.
  - (c) Outer layers of wire on side facing blast partially fused together.
  - (d) Continuity of wire OK and wire serviceable.

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III. Buried Wire Lines: Undamaged and serviceable.

IV. Radio Sets.

a. SCR-536

- (1) Unit below ground undamaged and serviceable.
- (2) Unit above ground: Antenna pointing away from blast.
  - (a) Paint scorched on exposed positions.
  - (b) Strap burned and scorched but serviceable.
  - (c) Unit moved six (6) inches.
  - (d) Unit serviceable.

b. SCR-300

- (1) Unit below ground.
  - (a) Top two (2) sections of 15 foot whip antenna, extending above ground, were blown 16 feet away from blast, and slammed to surface of ground with sufficient force to assume contour of ground.
  - (b) Unit serviceable.
- (2) Unit above ground: Antenna pointing away from blast.
  - (a) Unit strapped to sandbag, simulating a man.
  - (b) Paint scorched on exposed portions.
  - (c) Bottom of unit facing blast slightly dished in.
  - (d) Bakelite parts (handset and mike plug) exposed to blast, scorched and mike plug indicated slight melting.
  - (e) Carrying bag and strap equipment scorched and burned. Strap equipment serviceable but carrying bag has bottom burned out.
  - (f) Mike plug partially blown out of jack. When restored unit was serviceable.

c. SCR-508 series mounted in three (3) tanks: M-4A3, M-24, and M-46.

- (1) All receivers serviceable, no apparent damage.
- (2) Transmitters in M-4A3 and M-46, final stages inoperative.
- (3) Transmitter power supply in M-24 tank inoperative.
- (4) Top sections of antennas hit ground or rear of tank due to force of blast causing sections to bend.
- (5) Exposed rubber fittings at base of antennas scorched.

V. Telephone Equipment.

a. Telephone EE-3

- (1) Units underground.
  - (a) Undamaged and serviceable.
  - (b) Dust and dirt possible cause of future service failure.
- (2) Unit above ground strapped to 2 X 4 stake.
  - (a) Canvas case scorched on side toward blast.
  - (b) Exposed area of handset scorched.

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- (c) Handset cord undamaged.
- (d) Unit serviceable.
- b. Switchboard BD-72, underground.
  - (1) Force of blast operated all drops.
  - (2) Sufficient dirt and dust blown into equipment to noticeably impair operation.
  - (3) Unit serviceable.
- c. Emergency Switchboard SB 18/GT, underground.
  - (1) Undamaged and serviceable.
- d. Terminal Strip TM-184
  - (1) Units underground.
    - (a) Undamaged and serviceable.
  - (2) Units above ground.
    - (a) Scorched and warped.
    - (b) Unit serviceable.
- e. Reel Equipment CE-11, above ground.
  - (1) Handset
    - (a) Unit moved to limit of attached cord.
    - (b) Unit scorched on areas facing blast.
    - (c) Unit serviceable.
  - (2) Reel
    - (a) Unit blown 70 feet away from blast.
    - (b) Fabric carrying straps burned through and unserviceable.
    - (c) Crankhandle of reel blown off.
    - (d) Reel terminal block charred but serviceable.
    - (e) Unit serviceable to a limited degree.

VI. Converters M-209

- a. Unit underground.
  - (1) Cover blown open by blast.
  - (2) Unit undamaged and serviceable.
  - (3) Dust and dirt possible cause of future service failure.
- b. Unit above ground.
  - (1) Unit blown sixteen (16) feet away from blast.
  - (2) Empty case blown sixty-six (66) feet away from blast.
  - (3) Technical manuals scattered, burned, and unserviceable.
  - (4) Unit facing blast with cover open.
    - (a) Insides scorched.
    - (b) Tape charred and burned.
    - (c) Operating handle scorched.
    - (d) Screwdriver handle burned.
  - (5) Unit serviceable but sufficient dirt and dust blown into equipment to noticeably impose faulty operation.

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NEVADA  
CAMP DESERT ROCK, NEVADA  
SIGNAL SECTION, III CORPS  
DOG DAY SHOT

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TEST POSITION #2

1600 Yds from Ground Zero

1 November 1951

- I. Open Wire Pole Line.
- a. (1) All poles burned on the side toward blast.  
(2) All poles badly checked.
  - b. Number one (1) pole, guyed three (3) ways.  
(1) West dead end guy pulled out at top attachment permitting pole top to be pulled to the east approximately two (2) feet.
  - c. Number two (2) pole unguyed swayed six (6) feet out of line North and South and came to rest with top six (6) feet out of line to South.
  - d. Number three (3) pole, single guyed, showed evidence of slackened guy wire.
  - e. Number four (4) pole, guyed four (4) ways, west guy showed evidence of being slackened slightly.
  - f. All wires down except spiral 4, CC-358, No 9 Iron W-76, and Copper W-74.
  - g. Wire, WD-1/TT  
(1) Broken in several places.  
(2) Insulation missing from portion of wire.  
(3) Remaining insulation melted and fused.
  - h. Wire, W-143  
(1) Broken in several places.  
(2) Fabric insulation charred and burned.  
(3) Rubber insulation slightly scorched.
  - i. Wire, W-110  
(1) Broken in several places.  
(2) Fabric insulation charred and burned.  
(3) Rubber insulation slightly scorched.
  - j. Spiral 4, CC-358  
(1) Rubber sheath was blackened.  
(2) Inside rubber wrapping OK.  
(3) Serviceable.
  - k. Spiral 4, WF7/G  
(1) Broken in several places.  
(2) Plastic sheath melted off in places.  
(3) Inside plastic wrapping OK.

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- l. Wire, Iron, W-76
  - (1) Undamaged and serviceable.
- m. Wire, Copper, W-74
  - (1) Wire stretched but otherwise undamaged and serviceable.

II. Surface Layed Wire Lines.

- a. All wires lines displaced, away from blast, to limit of free slack.
- b. Wire, WD-1/TT
  - (1) Insulation slightly charred at TM-184 at foxhole J.
  - (2) Serviceable.
- c. Wire, W-143
  - (1) Insulation slightly scorched at TM-184 at foxhole J.
  - (2) Serviceable.
- d. Wire, W-110
  - (1) Insulation slightly scorched at TM-184 at foxhole J.
  - (2) Serviceable.
- e. Spiral 4, CC-358
  - (1) Insulation slightly blackened at TM-184 at foxhole J.
  - (2) Serviceable.
- f. Spiral 4, WF-7/G
  - (1) Insulation slightly blackened at TM-184 at foxhole J.
  - (2) Serviceable.
- g. Coils, C-114
  - (1) No noticeable damage.
- h. Wire, WD-1/TT, in dispenser
  - (1) Unit below ground undamaged and serviceable.
  - (2) Unit above ground:
    - (a) Unit displaced twelve feet away from blast.
    - (b) Portion of canvas case facing blast was charred and torn slightly.
    - (c) Continuity of wire OK and wire serviceable.

III. Buried Wire Lines: Undamaged and serviceable.

IV. Radio Sets.

- a. SCR-536
  - (1) Unit below ground undamaged and serviceable.
  - (2) Unit above ground; antenna pointing away from blast.
    - (a) Unit moved seven (7) feet away from blast.
    - (b) Undamaged and serviceable.

Security Information

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ATOMIC ENERGY ACT 1946

**UNCLASSIFIED**

**UNCLASSIFIED**

Security Information

- b. SCR-300
  - (1) Unit below ground:
    - (a) Unit tipped away from blast.
    - (b) Unit undamaged and serviceable.
  - (2) Unit above ground; antenna pointing away from blast.
    - (a) Unit strapped to sand bag simulating a man.
    - (b) Bottom section of antenna facing blast charred.
    - (c) Unit undamaged and serviceable.
- c. SCR-528 series mounted in three (3) tanks: M-4A3, M-24, and M-26.
  - (1) All units undamaged and serviceable.
- d. AN/VRC-2 mounted in 1/4 ton 4 X 4.
  - (1) Antenna bent to an angle of 45 degrees away from blast.
  - (2) Serviceable.

V. Telephone Equipment.

- a. Telephone EE-8
  - (1) Units underground:
    - (a) Undamaged and serviceable.
  - (2) Unit above ground:
    - (a) Canvas case on side toward blast slightly scorched.
    - (b) Serviceable.
- b. Switchboard ED-72, underground.
  - (1) Some dust and dirt but unit undamaged and serviceable.
- c. Emergency Switchboard SB 18/GT, underground.
  - (1) Undamaged and serviceable.
- d. Terminal Strip TM-184.
  - (1) Units underground:
    - (a) Undamaged and serviceable.
  - (2) Units above ground:
    - (a) Scorched.
    - (b) Serviceable.
- e. Reel Equipment CE-11, above ground.
  - (1) Handset
    - (a) Moved away from blast two (2) feet.
    - (b) Unit serviceable and undamaged.
  - (2) Reel
    - (a) Unit blown thirty-six (36) feet away from blast.
    - (b) Slight unraveling of fabric of carrying strap.
    - (c) Unit serviceable.

Security Information

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Security Information

VI. Converters, M-209.

- a. Unit underground.
  - (1) Unit undamaged and serviceable.
  - (2) Dust and dirt possible cause of future service failure.
  
- b. Unit above ground.
  - (1) Unit blown eight (8) feet away from blast.
  - (2) Exposed technical manuals undamaged.
  - (3) Slight charring on tape.

  
Security Information

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ATOMIC ENERGY ACT 1946

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TEST POSITION #3  
2500 Yds from Ground Zero

1 November 1951

I. Open Wire Pole Line.

- a. (1) All poles burned on the side toward blast.  
(2) All poles slightly checked.
- b. Number one (1) pole, guyed three (3) ways.
  - (1) All guys loose.
  - (2) Cross arms slightly twisted.
  - (3) Insulators on pins 3 and 4 blown off.
  - (4) Pole loose in ground.
- c. Number two (2) pole, unguyed.
  - (1) Very loose in ground.
- d. Number three (3) pole, single guyed, showed evidence of slackened guy wire.
  - (1) Pole loose in ground.
  - (2) Cross arms twisted four (4) inches out of line.
- e. Number four (4) pole, guyed four (4) ways.
  - (1) Guys loosened severely.
  - (2) Cross arms slightly twisted.
  - (3) TM-184 burned and wires torn off.
- f. All wires and cables twisted and tangled.
  - (1) Unserviceable.
- g. Wire, WD-1/TT
  - (1) Twisted with other pairs.
  - (2) Insulation slightly burned.
- h. Wire, W-143
  - (1) Twisted with other pairs.
  - (2) Insulation slightly burned.
- i. Wire, W-110
  - (1) Twisted with other pairs.
  - (2) Insulation slightly burned.
- j. Spiral 4, CC-358
  - (1) Slight blackening of insulation.
  - (2) Twisted with other pairs.
- k. Spiral 4, WF-7/G
  - (1) Slight blackening of insulation.
  - (2) Twisted with other pairs.

**UNCLASSIFIED**

Security Information

- l. Wire, Iron W-76
  - (1) Twisted with other pairs.
- m. Wire, Copper W-74
  - (1) Slight stretching, twisted with other pairs.

II. Surface Layed Wire Lines.

- a. Wire, WD-1/TT
  - (1) Insulation blistered at TM-184 at foxholes J and K.
  - (2) Were Stretched.
  - (3) Serviceable.
- b. Wire, W-143
  - (1) Insulation scorched at TM-184 at foxholes J and K.
  - (2) Serviceable.
- c. Wire, W-110
  - (1) Insulation scorched at TM-184 at foxholes J and K.
  - (2) Serviceable.
- d. Spiral 4, CC-358
  - (1) Insulation slightly blackened at TM-184 at foxholes J and K.
  - (2) Serviceable.
- e. Coils, C-114
  - (1) No noticeable damage.
- f. Wire, WD-1/TT, in dispenser
  - (1) Unit below ground:
    - (a) Insulation fused in spots.
    - (b) Serviceable.
  - (2) Unit above ground:
    - (a) Portion of canvas case facing blast blackened.
    - (b) Insulation on conductors fused together.
    - (c) Continuity of wire OK and wire serviceable.

III. Buried Wire Lines: Undamaged and serviceable.

IV. Radio Sets.

- a. SCR-536
  - (1) Unit below ground:
    - (a) Covered with dirt and dust but undamaged and serviceable.

Security Information

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RESTRICTED  
ATOMIC ENERGY ACT 1946

**UNCLASSIFIED**



- (2) Unit above ground; antenna pointing away from blast.
  - (a) Paint scorched slightly.
  - (b) Unit serviceable.

b. SCR-300

- (1) Unit below ground:
  - (a) Covered with dust and dirt.
  - (b) Paint on antenna slightly burned.
  - (c) Unit serviceable.
- (2) Unit above ground; antenna pointing away from blast.
  - (a) Paint slightly burned.
  - (b) Unit serviceable.

c. SCR-528 series mounted in M-4A3 tank.

- (1) Undamaged and serviceable.

d. ANGRAC/9 in 3/4 ton 4 X 4.

- (1) Undamaged and serviceable.

V. Telephone Equipment.

a. Telephone EE-8

- (1) Units underground:
  - (a) Undamaged and serviceable.
- (2) Units above ground:
  - (a) Slight sandblasting and charring.
  - (b) Unit serviceable.

b. Switchboard BD-72, underground.

- (1) Covered with sand but unit undamaged and serviceable.

c. Emergency Switchboard SB 18/GT, underground.

- (1) Covered with sand but unit undamaged and serviceable.

d. Terminal Strip TM-184.

- (1) Units underground:
  - (a) Undamaged and serviceable.
- (2) Units above ground:
  - (a) Slight Scorching.
  - (b) Serviceable.

e. Reel Equipment CE-11, above ground.

- (1) Slight sandblasting.
- (2) Serviceable.

**UNCLASSIFIED**

Security Information

VI. Coverters, M-209.

- a. Unit underground.
  - (1) Covered with sand possible cause for future failure.
  - (2) Serviceable.
  
- b. Unit above ground.
  - (1) Slight sandblast and paint scorch.
  - (2) Dust and sand possible cause for future failure.
  - (3) Serviceable.

**[REDACTED]**  
Security Information

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**[REDACTED]**  
ATOMIC ENERGY ACT 1946

**UNCLASSIFIED**

**UNCLASSIFIED**

TEST SITE  
CAMP DESERT ROCK, NEVADA  
SIGNAL SECTION, III CORPS  
DOG DAY SHOT

[REDACTED]  
Security Information

TEST POSITION #4  
3500 Yds from Ground Zero

1 November 1951

- I. Radio Set, SCR-608, in 2 1/2 ton 6 X 6.
  - a. Undamaged and serviceable.

[REDACTED]  
Security Information

[REDACTED]  
ATOMIC ENERGY ACT 1946

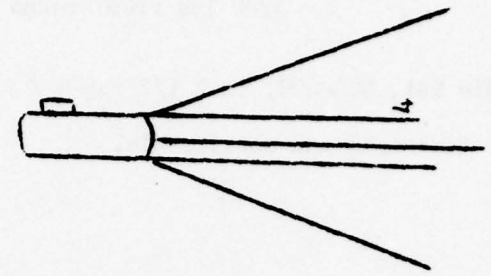
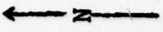
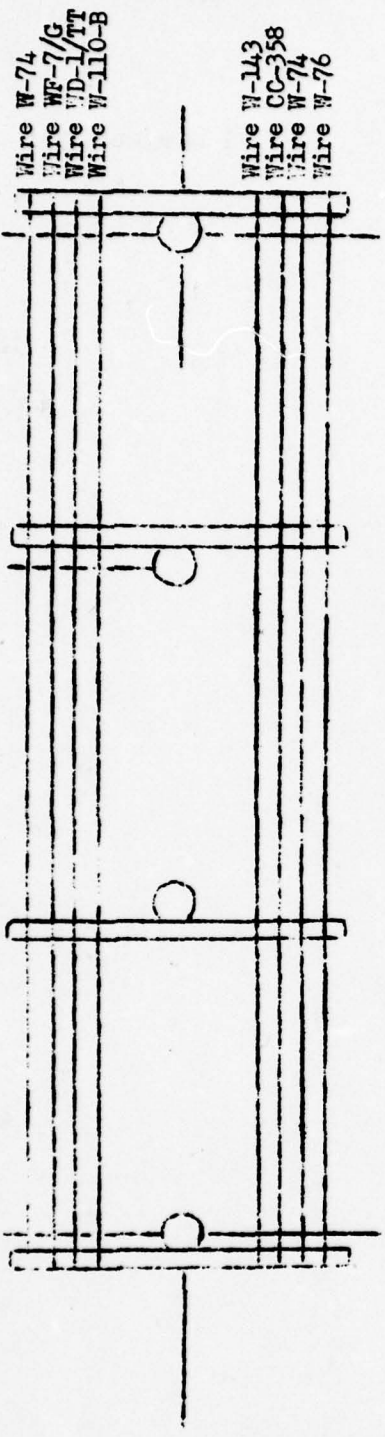
117

**UNCLASSIFIED**

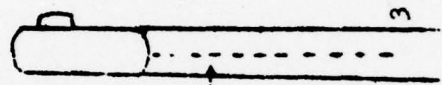


**UNCLASSIFIED**

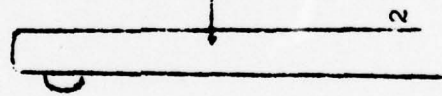
Security Information



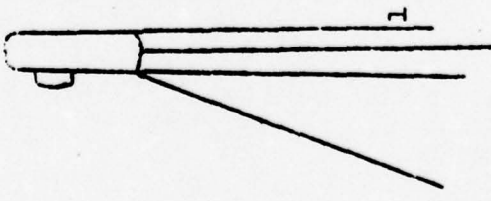
Guyed 4 ways  
N. S. E. & W.



Guyed 1 way  
N.



No Guys



Guyed 3 ways  
N. S. & W.

150'

NOTE: 150 ft. spans. 35 ft poles. 8 pin crossarms.  
Blast was from the North.  
Pin count from N. to S.

~~SECRET~~  
Security Information

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~~SECRET~~  
ATOMIC ENERGY ACT 1946

**UNCLASSIFIED**

# UNCLASSIFIED

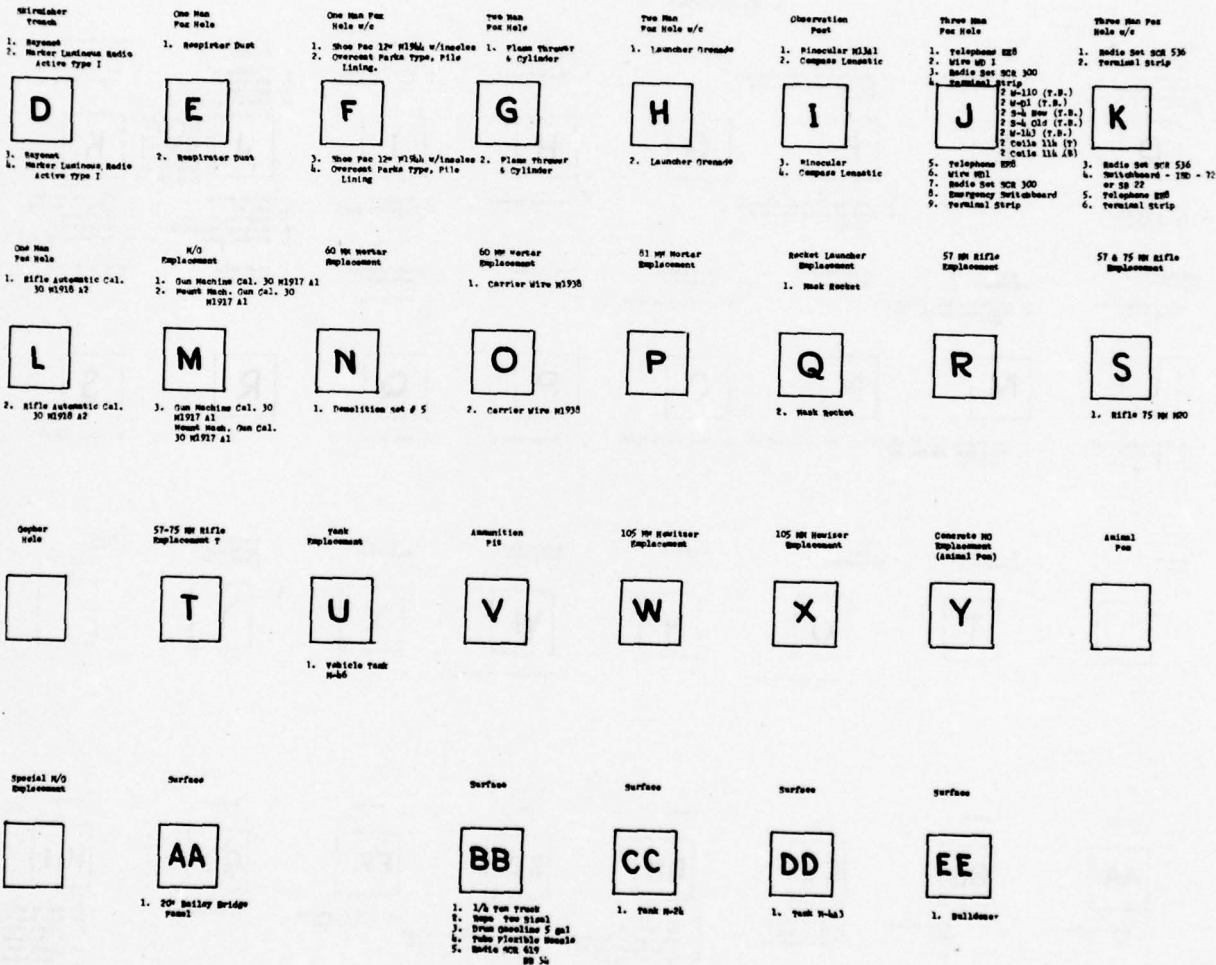
## Security Information

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Trouser Waist Serge</li> <li>2. Waist Pommel O.P.</li> <li>3. Waist Cotton Sash</li> <li>4. Trouser Cotton Sash</li> <li>5. Boots Service Combs</li> <li>6. Nylon Individual (case)</li> <li>7. Nylon Small S in 1 (case)</li> <li>8. Strap Quick Release</li> </ol> | <ol style="list-style-type: none"> <li>9. Pack Board Aluminum</li> <li>10. Watch Wrist</li> <li>11. Rifle M1</li> <li>12. Sniper Scope</li> <li>13. Mask Gas Service</li> <li>14. Helmet Steel</li> <li>15. Liner Helmet</li> </ol> |
|--|---|

P176 Trench and  
Sig TAG Communication  
Branch

B

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>16. Trouser Waist Serge</li> <li>17. Waist Pommel O.P.</li> <li>18. Waist Cotton Sash</li> <li>19. Trouser Cotton Sash</li> <li>20. Boots Service Combs</li> <li>21. Nylon Individual (case)</li> <li>22. Nylon Small S in 1 (case)</li> <li>23. Strap Quick Release</li> </ol> | <ol style="list-style-type: none"> <li>24. Pack Board Aluminum</li> <li>25. Watch Wrist</li> <li>26. Rifle M1</li> <li>27. Sniper Scope</li> <li>28. Mask Gas Service</li> <li>29. Helmet Steel</li> <li>30. Liner Helmet</li> </ol> |
|--|--|



**EQUIPMENT LAYOUT  
AT TEST POSITION NR. 1  
EXERCISE DESERT ROCK**

# UNCLASSIFIED

## Security Information

- 1. Messengers (M1) 30mm
- 2. M107 Cannon
- 3. M107 Cannon
- 4. M107 Cannon
- 5. M107 Cannon
- 6. M107 Cannon
- 7. M107 Cannon
- 8. M107 Cannon
- 9. M107 Cannon
- 10. M107 Cannon
- 11. M107 Cannon
- 12. M107 Cannon
- 13. M107 Cannon
- 14. M107 Cannon
- 15. M107 Cannon
- 16. M107 Cannon
- 17. M107 Cannon
- 18. M107 Cannon
- 19. M107 Cannon
- 20. M107 Cannon
- 21. M107 Cannon
- 22. M107 Cannon
- 23. M107 Cannon
- 24. M107 Cannon
- 25. M107 Cannon
- 26. M107 Cannon
- 27. M107 Cannon
- 28. M107 Cannon
- 29. M107 Cannon
- 30. M107 Cannon
- 31. M107 Cannon
- 32. M107 Cannon
- 33. M107 Cannon
- 34. M107 Cannon
- 35. M107 Cannon
- 36. M107 Cannon
- 37. M107 Cannon
- 38. M107 Cannon
- 39. M107 Cannon
- 40. M107 Cannon

### Wire Trench and Zig Zag Communication Trench

Animal Pen

**A**

**B**

Animal Pen

**C**

- 16. Trouser wool serge
- 17. M107 Cannon
- 18. M107 Cannon
- 19. M107 Cannon
- 20. M107 Cannon
- 21. M107 Cannon
- 22. M107 Cannon
- 23. M107 Cannon
- 24. M107 Cannon
- 25. M107 Cannon
- 26. M107 Cannon
- 27. M107 Cannon
- 28. M107 Cannon
- 29. M107 Cannon
- 30. M107 Cannon
- 31. M107 Cannon
- 32. M107 Cannon
- 33. M107 Cannon
- 34. M107 Cannon
- 35. M107 Cannon
- 36. M107 Cannon
- 37. M107 Cannon
- 38. M107 Cannon
- 39. M107 Cannon
- 40. M107 Cannon

Kindergarten Trench

- 1. Paycomt
- 2. Warner Luminous Active Type 1

**D**

One Man Fox Hole

- 1. Respirator Duct

**E**

One Man Fox Hole w/c

- 1. M107 Cannon
- 2. Overcoat Parke Type, Hole Lining

**F**

Two Man Fox Hole

- 1. Launcher Rocket

**G**

Two Man Fox Hole w/c

- 1. Launcher Rocket

**H**

Observation Post

- 1. Binocular
- 2. Compass

**I**

Three Man Fox Hole

- 1. Telephone E25
- 2. Wire M1
- 3. Radio set SCR 300
- 4. Terminal Strip

**J**

Three Man Fox Hole w/c

- 1. Radio set SCR 536
- 2. Terminal Strip

**K**

One Man Fox Hole

- 1. Rifle automatic Cal. 30 M1913 A2

**L**

M/T

- 1. Gun Machine Cal. 30 M1917 A1
- 2. Mount Mech. Gun Cal. 30 M1917 A1

**M**

60 MM Mortar

- 1. Mortar Cal. 60

**N**

60 MM Mortar

- 1. Carrier wire M1934

**O**

81 MM Launcher

- 1. Launcher Rocket

**P**

Rocket Launcher

- 1. Rocket Launcher

**Q**

57 MM Rifle

- 1. Rifle 57mm

**R**

57 & 75 MM Rifle

- 1. Rifle 75mm

**S**

Copper Hole

**T**

57 - 75 MM Rifle

- 1. Rifle 57mm

**U**

Task

- 1. Tank M-26

**V**

Sanitation Pit

- 1. Hoviteer 105 MM M24

**W**

105 MM Hoviteer

- 1. Hoviteer 105 MM M24

**X**

105 MM Hoviteer

- 1. Hoviteer 105 MM M24

**Y**

Concrete H.O.

- 1. Hoviteer 105 MM M24

**Z**

Animal Pen

- 1. Tank M-26

**AA**

Surface

**BB**

Surface

- 1. Tank M-26

**CC**

Pit

- 1. Tank M-26

**DD**

Surface

- 1. Tank M-26

**EE**

Pit

- 1. Tank M-26

**FF**

Surface

- 1. Tank M-26

**GG**

Surface

- 1. Tank M-26

**HH**

- 1. Tank M-26

**II**

- 1. Tank M-26

**JJ**

- 1. Tank M-26

**KK**

- 1. Tank M-26

**LL**

- 1. Tank M-26

**MM**

- 1. Tank M-26

**NN**

- 1. Tank M-26

**OO**

- 1. Tank M-26

**PP**

Security Information

EQUIPMENT LAYOUT AT TEST POSITION NR. 2 EXERCISE DESERT ROCK



# UNCLASSIFIED

## Security Information

- 1. Frontiers Map Serge
- 2. Shirt Plannel D.D.
- 3. Shirt Cotton Khaki
- 4. Frontiers Cotton Khaki
- 5. Hood Service Combat
- 6. Nation Individual (Case)
- 7. Nation Small 5 in 1 (Case)
- 8. Strap Quick Release
- 9. Pack Board Aluminum
- 10. Watch Wrist
- 11. Rifle M1
- 12. Mask Gas Service
- 13. Helmet Steel
- 14. Liner Helmet

Animal Pen

A

Fire Trench and  
Sig Sag Communication  
Trench

B

Animal Pen

C

Skirmisher  
Trench

- 1. Bayonet
- 2. Marker Luminous Radio Active Type I

D

- 3. Bayonet
- 4. Marker Luminous Radio Active Type I

One Man  
Fox Hole

- 1. Respirator Dust

E

- 2. Respirator Dust

One Man Fox Hole  
w/c

- 1. Shoes Pac 12" M1944 w/Insoles
- 2. Overcoat Parks, Type, Pile Lining

F

- 3. Shoes Pac 12" M1944 w/Insoles
- 4. Overcoat Parks, Type, Pile Lining

Two Man  
Fox Hole

Two Man  
Fox Hole w/c

- 1. Launcher Grenade

G

- 2. Launcher Grenade

Two Man Fox  
Hole w/c

- 1. Binocular M134
- 2. Compass Lenticular

H

- 3. Binocular
- 4. Compass Lenticular

Observation  
Post

- 1. Binocular M134
- 2. Compass Lenticular

I

- 3. Binocular
- 4. Compass Lenticular

Three Man  
Fox Hole

- 1. Telephone M28
- 2. Wire M21
- 3. Radio set SCR 300
- 4. Terminal Strip

J

- 5. Telephone M28
- 6. Wire M21
- 7. Radio set SCR 300
- 8. Emergency Switchboard
- 9. Terminal Strip

Three Man Fox  
Hole w/c

- 1. Radio set SCR 536
- 2. Terminal strip

K

- 3. Radio set SCR 536
- 4. Switchboard - 108 - 72 ORN 22
- 5. Telephone M28
- 6. Terminal Strip

One Man  
Fox Hole

- 1. Rifle Automatic Cal. 30 M1918 A2

L

- 2. Rifle Automatic Cal. 30 M1918 A2

N/O  
Emplacement

- 1. Gun Machine Cal. 30 M1917 A1
- 2. Mount Mach. Gun Cal. 30 M1917 A1

M

- 3. Gun Machine Cal. 30 M1917 A1
- 4. Mount Mach. Gun Cal. 30 M1917 A2

60 MM Mortar  
Emplacement

60 MM Mortar  
Emplacement

- 1. Carrier Wire M1938

N

- 2. Carrier Wire M1938

81 MM Mortar  
Emplacement

81 MM Mortar  
Emplacement

- 1. Carrier Wire M1938

O

- 2. Carrier Wire M1938

81 MM Mortar  
Emplacement

81 MM Mortar  
Emplacement

- 1. Rocket M1

P

- 2. Mask Rocket

Rocket Launcher  
Emplacement

Rocket Launcher  
Emplacement

- 1. Mask Rocket

Q

- 2. Mask Rocket

57 MM Rifle  
Emplacement

57 & 75 MM Rifle  
Emplacement

- 1. Rifle 75 MM A21

R

- 1. Rifle 75 MM A21

57 & 75 MM Rifle  
Emplacement

57 & 75 MM Rifle  
Emplacement

- 1. Rifle 75 MM A21

S

- 1. Rifle 75 MM A21

57-75 MM Rifle  
Emplacement 7

T

Tank  
Emplacement

U

ammunition  
pit

V

105 MM Howitzer  
Emplacement

W

- 1. Howitzer 105 MM M24

105 MM Howitzer  
Emplacement

X

Concrete H.Q.  
Emplacement  
(Animal Pen)

Y

Animal Pen

Z

Surface

AA

- 1. Water Purification set

Surface

BB

- 1. 1 ton trailer
- 2. 3 Oil SAE
- 3. Lubricant API

Surface

GG

- 1. Tank M43

Surface

CC

- 1. 3/4 ton truck
- 2. Rope Two Steel
- 3. Springlatch Fire C/P 1 qt
- 4. Drum Gasoline 5 gal
- 5. Tube Flexible Hose
- 6. Springlatch Fire C/P 4 lb
- 7. AS/MS-9

Surface

DD

- 1. Tank Light M24

Surface

EE

- 1. Truck 2 1/2 Ton
- 2. Rope Two Steel
- 3. MS-24 (50 coil)
- 4. Drum Gasoline 5 gal
- 5. Tube Flexible Hose
- 6. Radio set SCR 608

Surface

FF

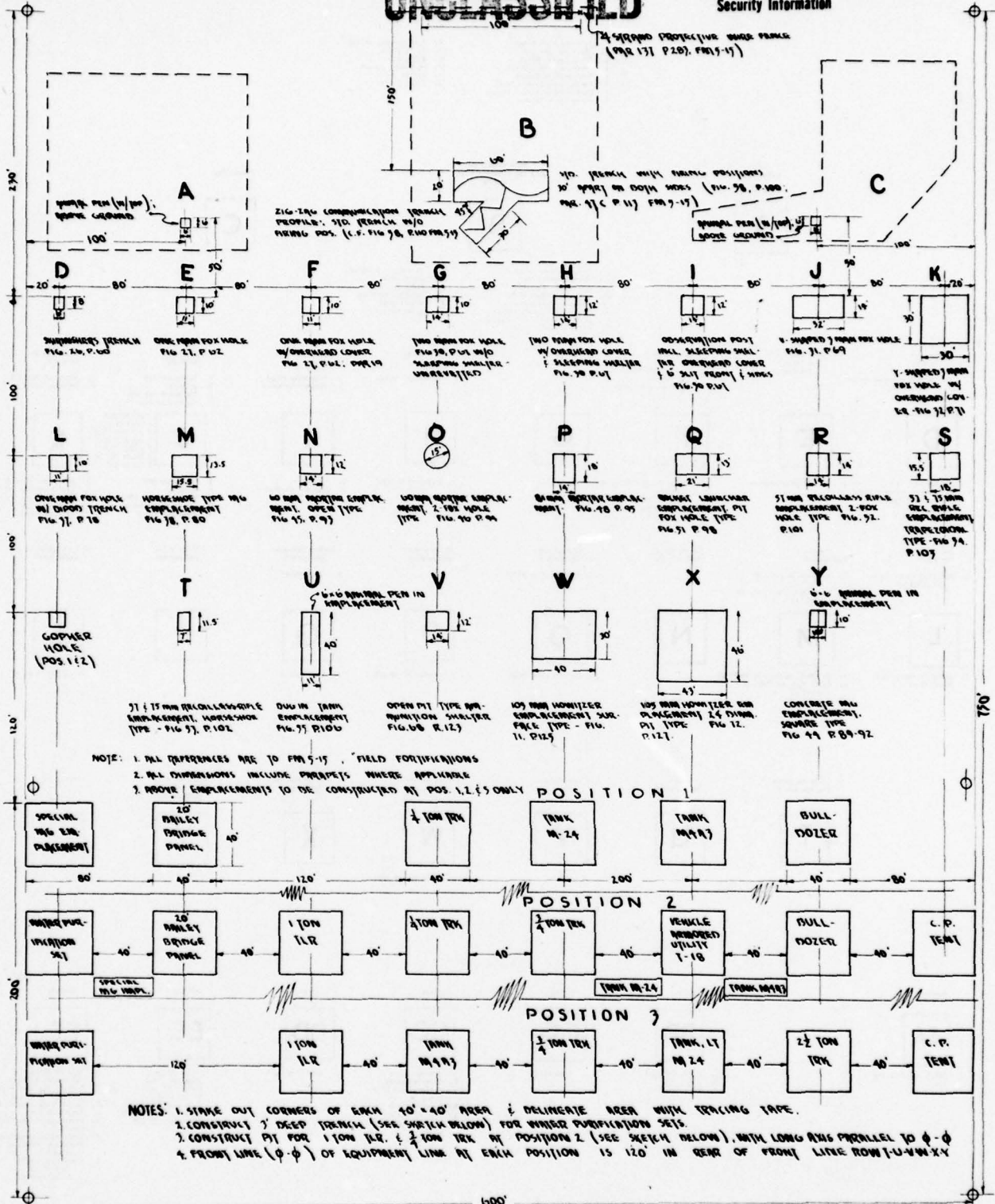
- 1. Tent CP M1944
- 2. Table Camp Folding
- 3. Transit Engineer Night Illuminated type I
- 4. Lantern Gasoline loaded Fuel w/Handle
- 5. First Aid Kit Medical Unit # 1
- 6. Range Field Component Parts and Details (Pack A)
- 7. Field Range M1937 (2 Pack B)
- 8. 3 can water 5 gal

EQUIPMENT LAYOUT  
AT TEST POSITION No. 3  
EXERCISE DESERT ROCK

Security Information

ATOMIC ENERGY ACT 1946

# UNCLASSIFIED



POSITION LAYOUT OPERATION DESERT ROCK

UNCLASSIFIED

Security Information

Surface



Animal Pen

Surface



1. Truck 2 1/2 Ton
2. Rope 700' 5/16"
3. MC-Gas (264 Oct)
4. Tube Flexible Hose 10'
5. Drum Gasoline 5 gal
6. Radio set SCR 608

Surface



Animal Pen

**EQUIPMENT LAYOUT**  
 AT TEST POSITION NR. 4  
 EXERCISE DESERT ROCK

Surface



1. Airplane L-5

Surface



Animal Pen

Pit



Animal Pen

Surface



Animal Pen

Pit



Animal Pen

UNCLASSIFIED

Security Information

ATOMIC ENERGY ACT 1946

**EQUIPMENT LAYOUT**  
 AT TEST POSITION NR. 5  
 EXERCISE DESERT ROCK



**UNCLASSIFIED**

Security Information



Can vas tank (left rear) of this water purification unit burned at 2500 yds.



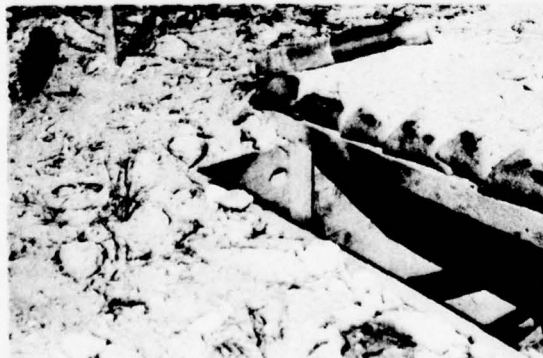
Recoilless rifle was undamaged after explosion at 2500 yds.



Sheep at 7000 yds. was unharmed. Heavy black on back is code marking dye.



L - 5 airplane fully operational at 7000 yds.



Exposed 105 mm rounds had powder trains burnt in fuzes at 1000 yds.

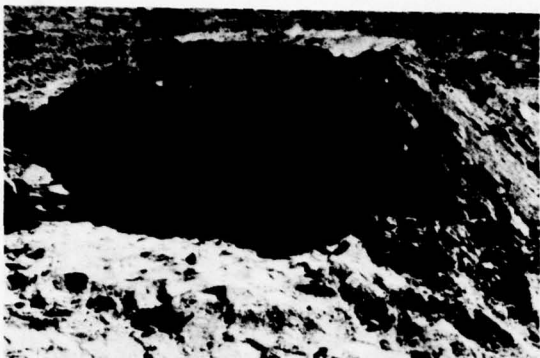


Packaged ammunition was undamaged at 1000 yds. Note explosion effects on adjacent sandbags.

**UNCLASSIFIED**

Security Information

ATOMIC ENERGY ACT 1946



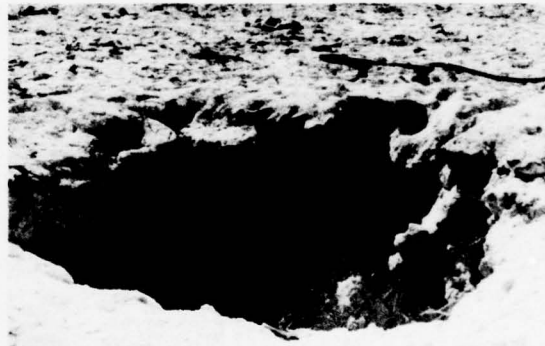
Observation post before explosion -- 1000 yds



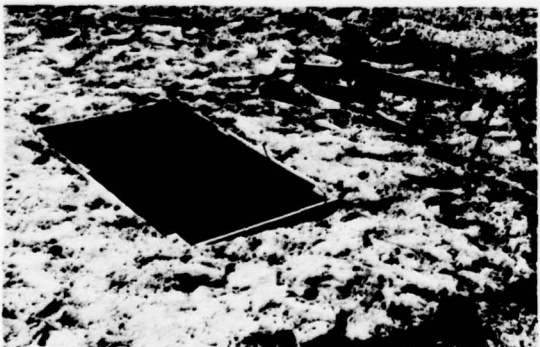
Observation post after explosion -- 1000 yds



Unrevetted fox hole before explosion -- 1000 yds



Unrevetted fox hole after explosion -- 1000 yds; hole is still useable



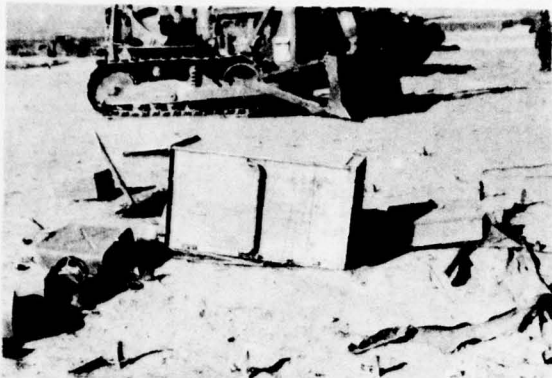
Revetted fox hole before explosion -- 1000 yds



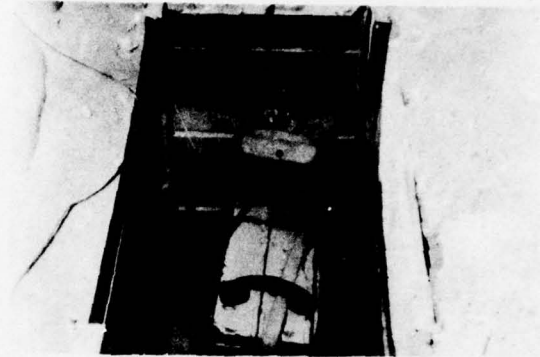
Revetted fox hole after explosion -- 1000 yds. Note charring of revetment and AR stock.

UNCLASSIFIED

Security Information



Remains of CP tent -- 1500 yds



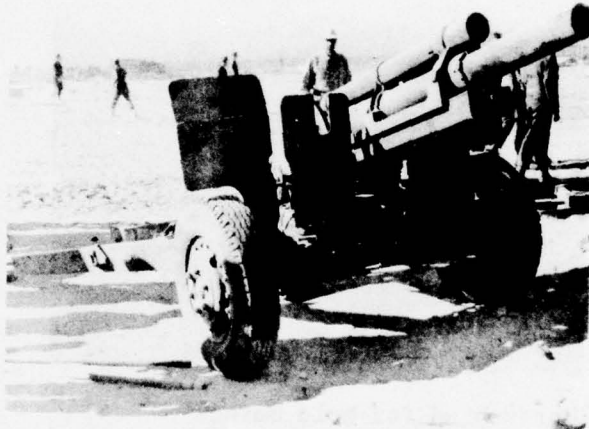
Communications equipment after explosion -- 1500 yds. Items were found serviceable.

- (13) 105 mm howitzer -- 1500 yds.  
No damage.

( Center Photo)

- (14) 81 mm mortar after explosion  
-- 1500 yds. Note scorch line  
on revettment.

(Lower Left Photo)



- (15) Jeep at 1500 yds with cracked  
windshield.

(Lower Right Photo)



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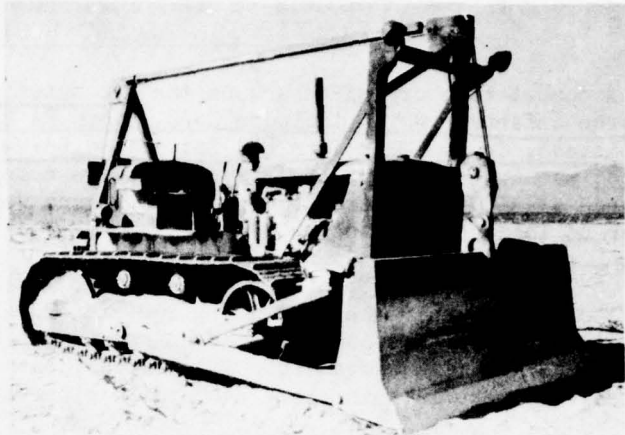


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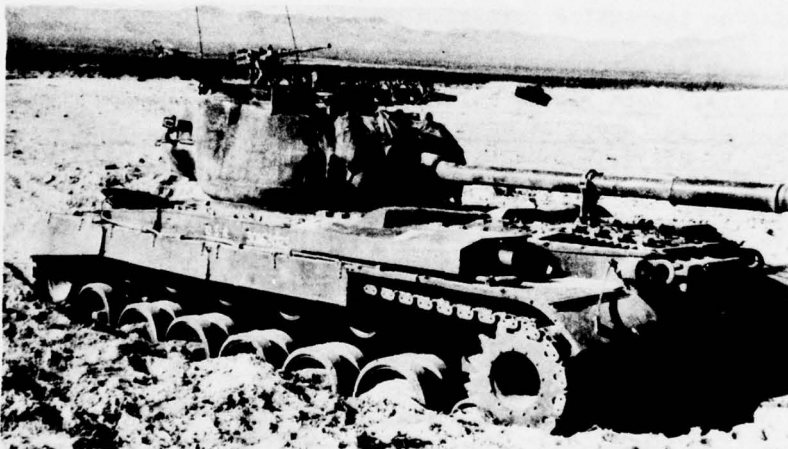
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Pole line after explosion  
-- 1000 yds. Second pole  
is down from blast.



Bulldozer at 1000 yds. was moved slightly  
by blast and scorched.



Tank after explosion  
-- 1000 yds

Bailey bridge after  
explosion -- 1000 yd  
Bridge was service-  
able



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THE USE OF TACTICAL TROOPS  
IN EXERCISE DESERT ROCK

A combat team organized around the 1st battalion of the 188th Airborne Infantry; which included Co C, 546th FA Bn (155 Howitzer); one platoon, Co A, 127th Engr (C) Bn; and 3d Bn Med Plat, 188th Air Med Co; was instructed to prepare a battalion defensive position at a distance of 3500 yards from the proposed ground zero (Opn O 1, and Letter of Instructions to the BCT).

On D-1, each soldier of the BCT was moved to his prepared defensive position, where he placed his individual equipment in the position he would have occupied had he remained there during the detonation, and film badged it. All weapons, both individual and crew served, were left in place along with other equipment of the unit.

On D-Day, H-Hour, all personnel of the BCT were at the prescribed distance of seven (7) miles from ground zero.

Following the detonation, and after the battalion position had been monitored, the battalion re-occupied its defensive positions. Prior to re-occupying the position, the BCT received a briefing covering the effects of the detonation on the entire battalion position.

On order, the BCT moved forward in an attack formation to an objective 500 yards from ground zero. Each attack column was headed by a monitor who had instructions to report at once a radiation reading of one roentgen per hour, or above, the maximum dosage prescribed by Commanding General, III Corps.

Upon reaching its objective, the BCT proceeded through test position Number 1 at 1000 yards, and test position Number 2 at 1500 yards. At test position Number 2, the BCT was briefed on effects on the equipment, emplacements and animals.

Prior to entrucking, each individual was checked for a radiological reading. In all cases the readings were found to be negligible.

Two (2) film badges were processed for each member of the BCT, one which had been left in the defensive position, which developed an average high reading of 341 milliroentgens (mr); the other badge, worn by the soldier on D-Day as he attacked to within 500 yards of ground zero, was also developed, it was found that the maximum reading was 200 mr with an average of only 57 mr.

It can be concluded that had the BCT occupied its defensive position and been alerted for the detonation, it would have been 100 per cent effective, further, that it could have accomplished its attack mission immediately following the detonation.

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REPORT OF AFSWP ADVISORY GROUP

I. Introduction

A. This Annex is intended to supplement the report prepared by Officer-in-Charge, Effects Tests, to provide in a separate place that Restricted Data received from the U.S. Atomic Energy Commission, and to furnish an evaluation of the damage causative factors in terms of the damage sustained.

B. The objectives of Exercise Desert Rock are outlined in the portion of this report prepared by OIC, Effects Tests.

C. Details of test layout and detailed description of damage will be found in report of OIC, Effects Tests, III Corps.

D. The mission and objectives of the Armed Forces Special Weapons Project Technical Advisors (EEG) are outlined in letter to Commanding General, III Corps, dated 25 September 1951, subject "Cooperation of III Corps and the Effects Test Group of the Technical Operations Squadron, Provisional, in Exercise Desert Rock", Headquarters, Technical Operations Squadron, Provisional. They are as follows:

1. Lt. Colonel Jones and assistants will:

- a. Record pre and post-test data necessary for an evaluation of the effects on animals and equipment. (See paragraph 3 below)
- b. Make an immediate tentative assessment of damage and/or injury and discuss this on the spot with all personnel.
- c. Assist in the writing of the technical part of the report of the CG, III Corps.
- d. Advise and assist in the execution of Desert Rock in any other way desired by your headquarters. (Hq. III Corps)

2. In fulfillment of this mission, the activities of the AFSWP Technical Advisors included the following:

- a. Submitted to CG, III Corps a plan of action to accomplish Effects Evaluation Program. In general, this plan outlined the following:
  - (1) Responsibility for preparation of emplacements and placing of equipment in positions.

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- (2) Film badge placement and recovery.
  - (3) Photographic coverage.
  - (4) Evaluation of effects in regards to timing and assistance required.
  - (5) Preparation of technical annex to report.
- b. Advised CG, III Corps in regards to placement and number of items used in test to fulfill the objectives and to satisfy safety requirements.
  - c. Draw up detailed plan for photographic coverage of test.
  - d. Give CG, III Corps an estimate of predicted damage based upon AFSWP Capabilities Handbook.
  - e. Advised CG, III Corps as to type of information which should be recorded for analysis of test results.
  - f. Made initial tentative assessment of damage and injury and briefed observers and Battalion Combat Team at test positions.
  - g. Provided Radiological Safety planning and supervision for the Operation Desert Rock.
  - h. Prepared technical portion of report on operation.

3. Gathering of pre and post-test data mentioned in paragraph 1 above was accomplished by III Corps Technical Service Personnel in accordance with III Corps Equipment Test Plan, 25 October 1951.

4. Scope. The scope of this Annex is in accordance with III Corps Equipment Test Plan, 25 October 1951, paragraph 4g, quoted as follows:

"g. Reports Data furnished by effects test personnel and the AFSWP Effects Evaluation Group will be consolidated into a single report. This report will be comprised of two sections:

(1) A description of physical damage sustained by equipment and emplacements. Damage comparison will be made in terms of the various distances at which equipment is placed from G.Z. Emphasis will be placed on categorizing damaged equipment as serviceable or non-serviceable.

(2) A field evaluation of damage causative factors, based on technical evaluation by the AFSWP Effects Evaluation Group and data from the Military Effects Line of the Effects Test Group. (OPERATION BUSTER - AEC)".

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5. In order to obtain information as soon after the shot as possible regarding the accuracy of drop, or deviation from intended Ground Zero, a triangulation system was devised and manned by AFSWP personnel headed by Captain R.A. Hinners, USN. This system enabled Effects Evaluation Group officers to have within 10 minutes after the explosion, accurate data upon which to base on-site briefings to observers.

  
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II. Planning Factors

A. Basis for Estimations

1. Yield ----25KT ✓
2. Height of Burst ----1350 feet ✓
3. Visibility ----Infinite
4. Delivery at Ground Zero
5. Effects data and criteria based on TM 23-200

B. Actual Shot Conditions

1. Yield ----21.5KT (preliminary estimate) ✓
2. Height of Burst ----1417 feet ✓
3. Visibility ----Infinite
4. Delivery Point ----56'N and 36'E of Intended Ground ✓  
Zero



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III. Expected and Actual Effects

A. Above ground effects

1. See Table A
2. It will be noted in Table A that all of the effects are on the order of 60% of those expected. While it is reiterated that the results shown are of a preliminary nature and in the case of blast based on extrapolated data from the Charlie shot, the evidence is strong that considerably less effects occurred than would be expected. The lowered yield stated in Section II, Planning Factors, is not sufficient to account for the discrepancies. It is strongly indicated that if the yield was as stated, and if these preliminary values are confirmed, urgent consideration should be given to revision of basic curves and data to allow more accurate predictions of effects under field conditions. It is of interest to note that the blast and thermal effects that occurred at Position One were those that were predicted to occur at Position Two. Those that occurred at Position Two were correspondingly lower.

B. Shielding provided by emplacements and vehicles

1. Blast: At all positions, the emplacements resisted the effect of the shock wave to the extent that personnel occupying them during the explosion would not have suffered mechanical injury. Although board revetments were bowed inward an average of 2 inches at Positions 1 and 2, none failed during Dog shot, the only failures being the unrevetted foxholes which caved at Position 1 and crumbled at Positions 2 and 3. In these cases, however, it is estimated that no injury would have been sustained by occupants. As an indication of the effect of air blast in the emplacements, it was noted that light articles and weapons placed upon the bottom or leaning against the sides were not displaced. Tanks would have provided blast protection at all positions. Windshield breakage occurred only at Position 1.
2. Thermal. In every case and at all positions, no objects in the shadow of the direct thermal radiation showed evidence of damage as a result of reflected thermal radiation. There was no instance of fires starting in the wood of the emplacements. Two cases of fires starting in exposed camouflage materials with secondary burning of rifle stocks occurred in

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the Battalion Combat Team area. It was indicated that a person taking advantage of line-of-sight shielding in any of the emplacements or tanks would have been safe from thermal effects. It appeared that tents and tops of military vehicles would have protected shaded persons from the thermal effects before being carried away.

3. Nuclear Radiation

- a. General: In conjunction with the field fortification test program of Exercise Desert Rock, a number of conventional film badges were utilized to give a general indication of the amount of protection that would have been afforded forewarned, friendly troops making proper use of their standard military field fortifications. Instrumentation, in general, was accomplished through the controlled placing of film badges in positions where personnel would have been at the time of the nuclear detonation. No attempt was made to thoroughly instrument these fortifications because an extensive program was being accomplished simultaneously on other fortifications by the Engineer Research and Development Laboratory of Fort Belvoir, Virginia, as a part of Operation BUSTER.
- b. Conclusions: In general, it was established that for this type of terrain and soil composition, significant protection from the prompt external radiation is afforded the individual soldier through the proper utilization of standard military field fortifications. At all of these distances (Fig. 1) the one-man foxhole, 81 m.m. mortar position, observation post, and the concrete machine gun emplacement reduce the radiation significantly. The maximum surface reading in the BCT area was 1.5 roentgens. There was no induced activity and no "fall-out." Hence, there was no military nuclear radiation hazard at the BCT position. The general principle of nuclear radiation protection afforded by shielding through several thicknesses of dirt is readily apparent by comparing the various radiation levels recorded in varying types of field fortifications at the test positions. See Inclosure 1. For example, the skirmisher trench affords relatively little protection, while the one-man foxhole located immediately adjacent reduced the surface radiation very considerably.
- c. Miscellaneous Effects
  1. Double Shock. As was evident from the observers' position, a double air shock took place, the second and smaller shock

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following the first by about one second. This was caused by reflection from a relatively warm layer of air or atmospheric inversion lying above the test site.

2. Missile and Dust Effects. Although there was no evidence of sand-blasting, there was a case at Position 2 of a rock having been driven completely through a lead and bakelite film badge. It is believed, however, that at this test, beyond the range where casualties would have been caused by thermal radiation, the missile hazard generally would have been small. The explosion caused a large volume of fine dust to be scoured out directly below and in the vicinity of ground zero, but in general did not disturb the rocks and pebbles lying on the surface beyond 200 to 300 yards from Ground Zero.

3. Ground Shock

Seismic records were obtained at two stations approximately 3 and 4 miles respectively from Ground Zero. Records are as follows:

Sta.	Max Acceleration cm/sec <sup>2</sup>	Period Sec	Max Displacement U	Period Sec
3 mi	10	0.5	900 microns	1
4 mi	5.2	0.5	1000 microns	1

These data would indicate an Energy Ratio of 0.04 ft<sup>2</sup>/sec<sup>2</sup> at the 3 mile station. Although no data is available for distances closer to the explosion, it appears probable that caving of unrevetted foxholes and bulging of revetments was chiefly a direct result of the air shock passing over the positions, since ground shock was of such low magnitude.

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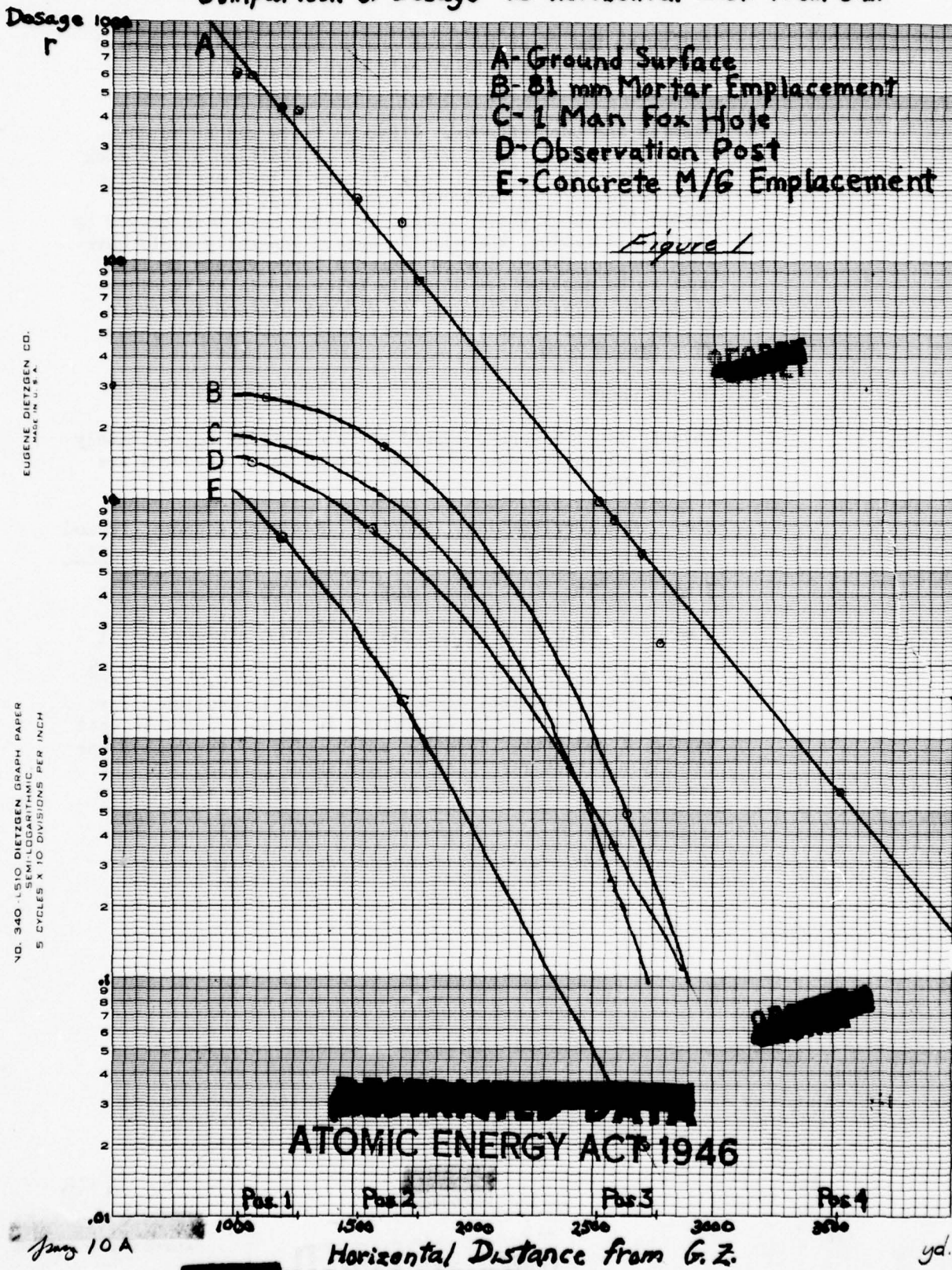
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Comparison of Dosage vs Horizontal Dist. from G.Z.



EUGENE DIETZEN CO.  
MADE IN U.S.A.

NO. 340 - LS10 DIETZEN GRAPH PAPER  
SEMI-LOGARITHMIC  
5 CYCLES X 10 DIVISIONS PER INCH

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**TABLE A**  
**Above Ground Effects\***

Position	Distance from Zero Point (yards)		Overpressure PSI		Thermal Cal/cm <sup>2</sup>		Prompt Gamma Dosage in Roentgens	
	Intended Ground Zero	Actual Ground Zero	Est.	Actual	Est.	Actual	Est.	Actual
1	1000	1020	16.5	6	72	39.6	1600	2600
2	1500	1520	7.6	4.2	34	21.6	200	340
3	2500	2520	3.2	2.7	13	8.2	4.5	12
4	3500	3520	1.7	2.1	6.5	4.3	Less than 1	Less than 1
5	7000	7020	0.5	0.5	1.5	0.9	Less than 1	Less than 1

Actual effects recorded are of a preliminary nature and subject to change after more complete analysis. Differences between estimated and actual effects and between AEC and Signal Corps nuclear radiation values cannot be explained without further study. Blast data extrapolated from "Charlie" measurements; AEC instruments did not function on "Dog" shot.

\*\* Signal Corps results

**IV. Correlation of Damage with Causative Factors**

The following lists typical damage done to representative items of interest. A complete listing of damage is to be found in that portion of this report prepared by OIC, Effects Tests

Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
1	1020	Elast.	6 psi	Weapons	(A) Overturned 75mm recoilless rifle in firing position. Sniperscope rendered inoperative. All other weapons unmoved and serviceable; all need cleaning before use due to dust.  (B) All serviceable, need cleaning before use due to dust.  Communications Radio antennas bent. (A) Field type radios serviceable. Radio transmitters on tanks inoperative; 30'X8" unguyed pole broken off 3' above ground, all wire lines on poles broken.  (B) All items serviceable.
				Transportation	$\frac{1}{2}$ T truck moved 5' backward; windshield broken, although in lowered position. Otherwise serviceable.  (B) None displayed.
				Armor	(A) M-24 tank moved back 2". Medium tanks unmoved.  (B) No damage



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Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
1	1020	Blast	6 psi	Miscellaneous	<p>Side on D-7 bulldozer moved 8". Sandbags ruptured and displaced 5-6'. Side on Bailey Bridge section (unanchored) moved 1½', foot-bridge torn off. Ration case blown 25 yds, contents undamaged.</p> <p>(A)</p> <p>(B) Some emplacements sustained light damage, top covers partially blown away and revetting bowed. Unrevetted emplacement caved in.</p>
		Thermal	40 cal/cm <sup>2</sup>	Weapons	<p>(A) Stocks scorched where exposed.</p> <p>(B) No damage</p>
				Communications	<p>Rubber burned, paint and plastic scorched. Insulation burned on wires. No internal damage to radios or telephones.</p> <p>(A)</p> <p>(B) No damage</p>
				Transportation	<p>Seats, paint and plastics scorched.</p> <p>(A)</p> <p>(B) None displayed</p>
				Armor	<p>(A) Paint scorched</p> <p>(B) Paint scorched where exposed.</p>
				Clothing	<p>(A) All clothing burned where exposed.</p> <p>(B) No damage.</p>

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Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
1	1020	Thermal	40 cal/cm <sup>2</sup>	Miscellaneous	(A) Sandbags burned where exposed, wood scorched, Gas mask burned and melted.  (B) No burning to articles shielded from direct thermal radiation.
		Radiation	700 R	All categories	No damage from initial radiation. No residual radiation present.

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Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
2	1520	Blast	4.2 psi	Weapons	(A) No damage or movement. (B) No damage, although cleaning before use needed because of dust.
				Communications	(A) Wires on pole line blown down except Spiral 4 CC-358, No. 9 iron W-76 and copper W-74. Unguyed 30'X8" pole 6' out of line at top. Radio aerials bent. (B) No damage
				Transportation	(A) 1/2 T truck windshield cracked, top blown off, was serviceable. (B) 3/4 T truck top blown off.
				Armor	(A) No damage (B) No damage
				Miscellaneous	(A) CP tent blown down, contents scattered. Sandbags tossed about, chemical tank and water pumps overturned. (B) Slight damage to emplacements, sandbags displaced. No emplacements caved in.
		Thermal	22 cal/ <sup>2</sup> cm	Weapons	(A) Stocks scorched where exposed. (B) No damage.
				Communications	(A) Paint, plastic scorched; rubber and insulation burned on wires. (B) No damage.

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Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
2	1520	Thermal	22 cal/cm <sup>2</sup>	Transportation	Paint scorched, top burned (A) on 1/4 T truck.  (B) Top of 3/4 T truck burned where exposed.
				Armor	(A) Paint scorched.  (B) Paint scorched where ex- posed.
				Clothing	(A) All clothing burned where exposed.  (B) No damage.
				Miscellaneous	CO tent burned, exposed (A) portion of sandbags burned, wood scorched.  (B) No damage.
		Radiation	170 R	All categories	No damage from initial radiation. No residual radiation present.

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Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
3	2520	Blast	2.7 psi	Weapons	(A) No damage or movement (B) No damage
				Communications	Radio and telephone instru- (A) ments undamaged. Wires on poles inoperative, wires on ground surface undamaged. (B) No damage
				Transportation	No damage, moved average of 3', (A) all vehicles facing explosion. (B) No damage.
				Armor	(A) No damage. (B) No damage.
		Thermal	8 cal/cm <sup>2</sup>	Weapons	(A) Paint scorched, stocks scorched. (B) No damage.
				Communications	Paint and wire insulation scor- (A) ched, no other damage. (B) No damage.
				Transportation	Paint scorched. (A) (B) No damage.
				Armor	(A) Paint scorched. (B) No damage.
				Clothing	(A) Clothing scorched. (B) No damage.
				Miscellaneous	Water tank made of dark green (A) canvas with 6" water in bottom burned causing secondary fires. (B) No damage.

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Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
3	2520	Radiation	10 R	All categories	No damage from initial radiation. No residual radiation present.

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Pos.	Dist. fm GZ (yards)	Cause	Amount	Category A-above grnd. B-below grnd.	Typical Results
4 and BCT	3520	Blast	2.1 psi	Miscellaneous	En CP tent ripped. No (A) damage to other items.  (B) No damage to any items below ground.
		Thermal	4 cal/cm <sup>2</sup>	Miscellaneous	Light paint scorch on (A) all exposed items.  (B) No damage to any item below ground.
		Radiation	0.6 R	All categories	No damage from initial radiation. No residual radiation present.

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Pos.	Dist fm GZ (yards)	Cause	Amount	Category A-above ground B-below grnd.	Typical Results
5	7020	All effects	Less than 1 psi Less than 1 cal/cm <sup>2</sup> Less than 1 R	All categories	No damage

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nos.	Dist fm GZ (yards)	Cause	Amount	Category A-above grnd B-below grnd	Typical Results
7	1130	Blast	5/5 psi	Ammunition (A)	Moved trip wires on AP mines enough to set off 1 out of 10. Moved 1 exposed round of 105 mm ammo 5'. Moved 2 boxes of ammo 5 and 20'.  (B) No damage, no displacement.
		Thermal	36 cal/cm <sup>2</sup>	Ammunition (A)	Scorched all wooden boxes, scorched all paint on ammo. Set off red smoke and tear gas grenades. Burned powder in bags and increments. Burned propellant in 57 and 75 mm recoilless ammo.  (B) No damage.
		Radiation	610 R	Ammunition	No damage from initial radiation, no residual radiation

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Pos.	Dist fm GZ (yards)	Cause	Amount	Category A-above grnd B-below grnd	Typical Results
8	1830	Blast	4 psi	Ammunition	(A) Moved trip wires on anti-personnel mines enough to set off 1 out of ten  (B) No damage, no displacement.
		Thermal	15 cal/cm <sup>2</sup>	Ammunition	(A) Scorched all wooden boxes, scorched all paint on ammo, set off red smoke and tear gas grenades. Burned powder in bags and increments. Burned propellant in 57 and 75 mm recoilless ammo.  (B) No damage.
		Radiation	56 R	Ammunition	No damage from initial radiation, no residual radiation present.

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Pos.	Dist fm GZ (yards)	Cause	Amount	Category A-above grd B-below grd	Typical Results
9	2880	Blast	1 psi	Ammunition (A)	No damage above or below ground, no displacement.
		Thermal	6.5 cal/cm <sup>2</sup>	Ammunition (A)	Scorched all wooden boxes, scorched all paint on ammo. Burned powder in bags and increments, burned propellant in 57 and 75 mm recoilless ammo.
		Radiation	3 R	Ammunition	(B) No damage. No damage from initial radiation, no residual radiation present.

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Pos.	Dist fm GZ (yards)	Cause	Amount	Category		Typical Results
				A-above grnd	B-below grnd	
7,8,9		All		Ammunition		All ammunition in containers was serviceable after explosion. There was no change in characteristics.

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Pos.	Dist fm GZ (yards)	Cause	Amount	Location	Description
2	1520	Blast	4.2 psi	Exposed above ground	Probable mechanical injury. Shock effect unknown.
				In emplacement	Probably no injury. Shock effect unknown.
		Thermal	22 cal/cm <sup>2</sup>	Exposed above ground	100% casualties from 3d degree burns and clothing burn.
				In vehicles	3rd degree burns if exposed to direct rays
		Radiation	170 R	Exposed above ground in vehicles	Sickness first day in 25% of personnel. 10% will need evacuation, no deaths expected.
				In tanks	No sickness, no deaths
In emplacements	No sickness, no deaths				

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Pos.	Dist fm GZ (yards)	Cause	Amount	Location	Description
3	2520	Blast	2.7 psi	All locations	Small probability of mechanical injury.
		Thermal	8 cal/cm <sup>2</sup>	Exposed, above ground	Over 60% casualties from burns. Clothing scorched.
				In vehicles, tanks, and em- placements	No casualties
		Radiation	10 R	All locations	No sickness, no deaths

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B. Estimated Injury to Personnel with Causative Factors

1. The following estimates are based upon amount of effects received. Tank and emplacement estimates based on film badge readings.

Pos.	Dist fm GZ (yards)	Cause	Amount	Location	Description		
1.	1020	Blast	6 psi	Exposed above ground	Probable mechanical injury.		
				In emplacements	Probably no mechanical injury. Shock effect unknown.		
				Thermal	40 cal/cm <sup>2</sup>	Exposed above ground	100% casualties from 3d degree burns, and clothing burns.
						In vehicles	3d degree burns if exposed to direct rays.
						In tanks	Unharmed
						In emplacements	Unharmed
		Radiation	700 R	Exposed above ground	100% sickness in 2-4 hrs. 100% deaths.		
				In vehicles	100% sickness in 2-4 hrs. 100% deaths.		
				In tanks	No sickness, no deaths		
				In emplacements	No sickness, no deaths		
				In skirmisher's trench	100% sickness in 4 hrs. 100% deaths.		

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Pos.	Dist fm GZ (yards)	Cause	Amount	Location	Description
4	3520	Blast	2.1 psi	All locations	No casualties
		Thermal	4 cal/cm <sup>2</sup>	Exposed above ground  In vehicles, tanks, and emplacements	Over 30% casualties from burns  No casualties.
		Radiation	0.6 R	All locations	No sickness, no deaths.

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Pos.	Dist fm GZ (yards)	Cause	Amount	Location	Description
5	7020	All	Less than 1 psi Less than 1 cal/cm <sup>2</sup> Less than 1 R	All locations	No casualties

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2. Injury sustained by animals (sheep) at various positions.

(A) Above ground, (B) below ground.

Pos.	Dist fm GZ (yards)	Cause	Amount	Description of Injury
1	1020	Blast	6 psi	(A) None displayed (B) No injury, no shock effect observed.
		Thermal	40 cal/cm <sup>2</sup>	(A) None displayed (B) No injury
		Radiation	700 R	(A) None displayed (B) Injury unknown. Same dosage in humans would not have caused sickness or deaths.

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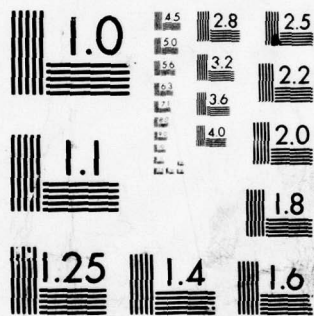
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

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Pos.	Dist fm GZ (yards)	Cause	Amount	Description of Injury
2	1520	Blast	4.2 psi	(A) No missile injuries, no shock effects observed. (B) No injuries, no shock effects observed.
		Thermal	22 cal/cm <sup>2</sup>	(A) Wool severely singed where exposed. Both sheep had backs towards explosion, therefore, no tender skin was exposed. (B) No injuries
		Radiation	170 R	(A) Injuries unknown. Same dosage to humans would not cause death. (B) No injuries.

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Pos.	Dist fm GZ (yards)	Cause	Amount	Description of Injury
3	2520	Blast	2.7 psi	(A) No injuries (B) No injuries
		Thermal	8 cal/cm <sup>2</sup>	(A) Wool singed where ex- posed. Both sheep had backs towards explosion
		Radiation	10R	(A) No injuries (B) No injuries

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Pos.	Dist fm GZ (yards)	Cause	Amount	Description of Injury
4	3520	Blast	2.1 psi	(A) No injuries (B) No injuries
		Thermal	4 cal/cm <sup>2</sup>	(A) Slight wool singeing, 2d degree burns about eyes and lips. (B) No injuries
		Radiation	0.6 R	(A) No injuries (B) No injuries

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Pos.	Dist fm GZ (yards)	Cause	Amount	Description of Injury
5	7020	all	Less than 1 psi Less than 1 cal/cm <sup>2</sup> Less than 1 R	(A) No injuries. (B) No injuries.

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C. Factors Affecting Damage to Emplacements

1. Although no emplacements caved-in to the extent that personnel would have been injured on Dog Shot, it should be noted that Charlie Shot created considerable damage to emplacements at Positions One and Two as follows:

Pos. 1

1B. Communication Trench. West lateral side bulged inward 8" and broken away except at corners.

1M. MG Emplacement. Back side bulged inward 6".

1S. 75mm Recoilless Rifle Emplacement. All sides caved, wall crushed inward, resulting in 50% volume decrease in emplacement.

Special MG Emplacement. Rear entrance caved.

Pos. 2

2P. 81mm Mortar Emplacement. 2S and T 75mm Recoilless Rifle Emplacements, and 2X 105mm Howitzer Emplacement. All had revetments bulged inward.

2. It is believed that the damage to 1S from "Charlie" was sufficiently severe so that injury would have resulted had the emplacement been occupied. In most cases the damage resulting from "Charlie" was repaired and new struts and braces added, making the revetments in some cases abnormally strong. It is believed that had the strengthening not been done, several of the emplacements at positions 1 and 2 would have caved from Dog Shot. The fact that dimensioned lumber revetting was used, that the ground was of a special type, namely unconsolidated alluvial fill and that power equipment was used in the excavations also make it difficult to generalize from this test as to damage that would be sustained by combat field fortifications.

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**V. Indications of Effectiveness of Units**

A. It is considered that the exposure of items was such that these results should be taken only as indications rather than as statistical results.

1. Position 1 (1000 yards)
  - a. Major items of materiel - 100% effective
  - b. Personnel
    - (1) Above ground - Non-effective
    - (2) Below ground - Nearly 100% effective  
(not considering the psychological effect due to the blast and confusion)
2. Position 2 (1500 yards)
  - a. Major items of materiel - 100% effective
  - b. Personnel
    - (1) Above ground - Non-effective
    - (2) Below ground - 100% effective
3. Position 3 (2500 yards)
  - a. Major items of materiel - 100% effective
  - b. Personnel
    - (1) Above ground - 40% effective
    - (2) Below ground - 100% effective
4. Position 4 and BCT (3500 yards)
  - a. Major items of materiel - 100% effective
  - b. Personnel
    - (1) Above ground - 70% effective
    - (2) Below ground - 100% effective

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5. Position 5 (7000 yards)

a. Major items of materiel - 100% effective

b. Personnel

(1) Above ground - 100% effective

(2) Below ground - 100% effective

B. It can be concluded that the test weapon would have been relatively ineffective against properly emplaced troops. The possible psychological effects are beyond the scope of this report.

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## VI. Limitations of Test

A. The test was laid out principally to demonstrate that atomic weapons could be used in close support of emplaced friendly units without serious damage to the supported units. Due to this fact, the weapon was detonated forward of the positions and not above them as would be the case in attacking an enemy target, moreover, exposed articles were generally in an attitude typical of a defensive situation and were as a result somewhat less vulnerable to the effects of the weapons. As a result, it is considered that this test was of limited value as the basis for predicting damage to an enemy troop target, since the equipment layout stopped short of the major damage radius and the orientation of emplacements and equipment was not typical of a target area.

B. The number of items of each kind in each position was limited to one. Thus, this test is useful for providing general indications, but does not provide an adequate statistical basis for drawing general conclusions relative to the effectiveness of atomic weapons.

C. It should be borne in mind that this was a relatively small nuclear explosion fired under special topographic and atmospheric conditions and the results by themselves should not be used as the basis for changes in doctrinal concepts. For example, an observer could conclude from this test that the effective damage radius from this explosion would be on the order of one-half mile or a damage area of about one square mile. However, by looking more carefully at the data obtained it can be seen that casualties to exposed troops would have occurred even at the Battalion Combat Team position, a distance of two miles from ground zero. The damage area involved in the second case is roughly twelve square miles. This area would more accurately represent the damage which could be inflicted on an enemy attack formation even with this small explosion, since most of the personnel would necessarily be in the open.

D. Another factor which tended to create a lower level of blast damage is that the weapon was detonated at an altitude considerably lower than the optimum height for maximum blast effect. Had the optimum height of burst been employed, the blast pressure on the ground would have increased by roughly 25% and would have covered a greater area.

E. From the standpoint of safety considerations to friendly troops, it must be remembered that the bombing accuracy in this test drop was better than can be expected in combat operations. Consequently, considerations must be given to the CEP (Circular Error Probable) demonstrated under combat conditions when establishing safety limits for combat drops.

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F. From the appearance, after the explosion, of the sheep positioned above ground, an observer would probably have concluded that little injury would have been sustained had personnel been similarly exposed. However, the injury to personnel would have been much more severe. In most cases, the sheep's wool acted as an excellent insulator, merely singeing or scorching on the surface. However, where the tender skin around the sheep's eyes and mouth was exposed, as happened at Position 4, this skin was burned. The skin of personnel would have been similarly burned.

VII. Conclusions

A. This test provided a valuable field check on published weapons effects data and damage criteria. It appears from preliminary examination that current effects data should be extended to take into account varied field conditions.

B. Properly warned, emplaced, or armored troops are relatively insensitive to the effects of an air burst atomic weapon. In this test, there was no significant damage to tanks, emplacements, or to simulated protected personnel at or beyond 1000 yards.

C. Troops in the open (unprotected) are sensitive to the effects of an air burst atomic weapon. In this test, there would have been serious casualties out to 3500 yards. In this test, the damage area for personnel in the open was roughly 12 times that for emplaced troops.

D. Weapons and equipment are relatively insensitive to the effects of air burst atomic weapons.

E. Induced radiation or fall-out did not constitute a deterrent to the prompt entry of troops into the ground zero area in this test.

F. The missile hazard did not appear serious at significant ranges from ground zero.

G. Military effects tests should, if possible, be isolated from the effects of prior explosions, and should be performed with weapons of known characteristics.

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### VIII. Recommendations

A. That the information gained through this test be used in comparing and examining current effects data with a view towards providing complete and accurate data for field analysis purposes.

B. That the results of this test should not be used by themselves as the conclusive basis for determining the effectiveness of atomic weapons for tactical purposes or for making doctrinal changes.

#### C. Future Tests

1. In order to take maximum advantage of future tests and obtain reliable information, the following recommendations are made:

- a. Prior to the conduct of tests, a careful study of past experience and existing test data should be made. The study should include detailed analysis of typical tactical targets to a degree of refinement commensurate with delivery accuracy, and data validity.
- b. Determination of basic effects with respect to how they vary with different weapons, atmospheric conditions, topography, and other target and weapons characteristics, should be emphasized.
- c. When items are selected for test they should be typical of those which are of major importance in analysis of enemy targets and in assessing effects on friendly targets, and should be exposed as they would be in a combat area.
- d. A sufficient number of items, appropriately oriented, should be used so as to provide statistically reliable results. Only those items about which reasonable doubt exists as to probable damage should be tested.
- e. Test layout should include positions from ground zero out to the region of no damage to show the levels of damage as a function of distance as completely as possible. Emplacements tested should be of the same type of materials and construction as those actually used under combat conditions.
- f. For indications of damage to human beings and particularly for demonstrations careful consideration should be given to the animals or other devices to be used so that results will be reasonably applicable to human beings. The use of volunteer personnel at reasonable distances should be considered.

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## NUCLEAR RADIATION SHIELDING AFFORDED BY FIELD FORTIFICATIONS

### A. Location of Film Badges

1. Test Positions: Film badges were placed throughout test Positions 1, 2, 3, 4, and 5 as shown in attached film badge layouts, Figures A(1), (2), (3), and (4). The fortifications described were constructed in accordance with FT 5-15. The badges were attached either with paper masking tape or with small nails through the corners of the plastic envelopes at the positions indicated. Specific examples of the positioning of the badges within four selected fortifications are indicated in Figure B. In addition, badges were placed in the left front jacket pockets of the dummies used in the test.
2. Battalion Combat Team (BCT) Position: Film badges were placed as indicated in Figure C. Each man secured a film badge to his rifle by sliding the bolt forward on the corner of the plastic envelope containing the film badge. Additional badges were attached to other sample items of equipment left in the BCT area as indicated in Section C below.

### B. Types of Conventional Film Badges Used

1. National Bureau of Standards film badge holders containing one DuPont #566 film packet (range: approx. 10-2000 roentgens/ per holder.
2. DuPont #553 film packets (range: approx. 0.1-250 roentgens) in clear plastic envelopes.

### C. Number of Badges Used

1. See attached Table C-1.
2. See attached Table C-2.

*per dosimeter as well  
as unoccupied psns.*

### D. Processing and Reporting of Badges

All film badges were processed and reported by qualified Signal Corps personnel using a mobile Signal Corps processing truck located at the Nevada Test Site. All processing and reporting was completed within five days after the test. The badges were processed for five minutes at 68 degrees Fahrenheit in Kodak liquid dental x-ray developer. The films were read by means of an Ansco-Sweet photo densitometer. The film was calibrated with a Cobalt<sup>60</sup> source.

### E. Residual Radiation:

Essentially all of the radiation levels recorded on the film badges were due to the prompt gamma radiation during the first 90 seconds

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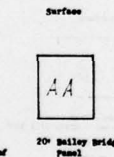
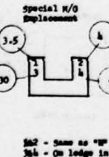
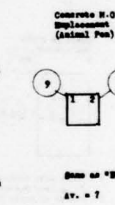
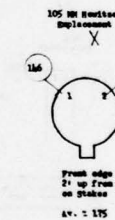
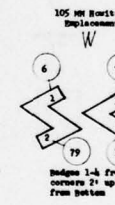
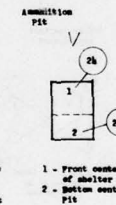
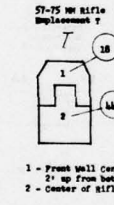
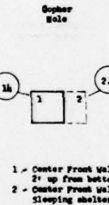
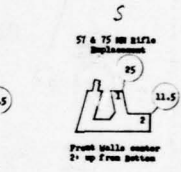
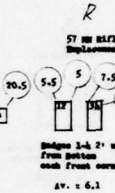
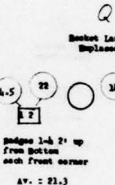
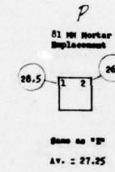
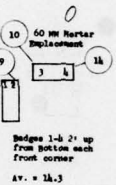
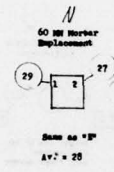
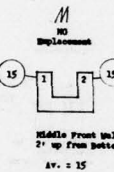
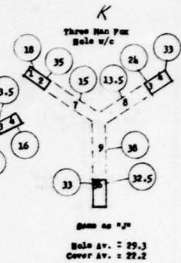
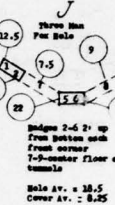
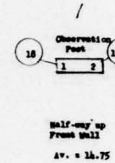
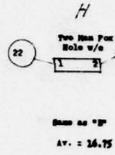
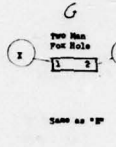
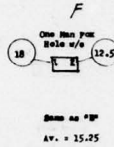
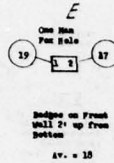
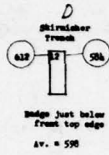
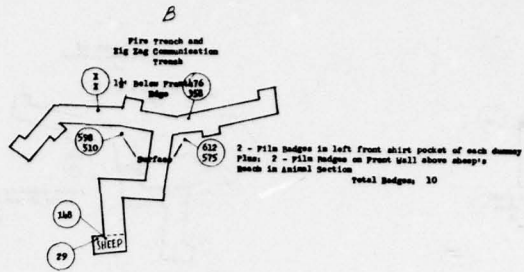
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after the nuclear detonation. There was no measurable fall-out in the test position areas and only at Positions 1 and 2 was there any induced radiation. At Position 1 the activity, as measured with the MX-5 G.M. Survey Meter, held one foot off the ground with the beta window open, was an average of 5 mr per hour. The activity at Position 2, read in the same way, was 3 mr per hour. The badges were collected within the first 3 hours after the nuclear detonation, hence indicated film badge readings do not reflect any significant radiation other than that received during the first 90 seconds.

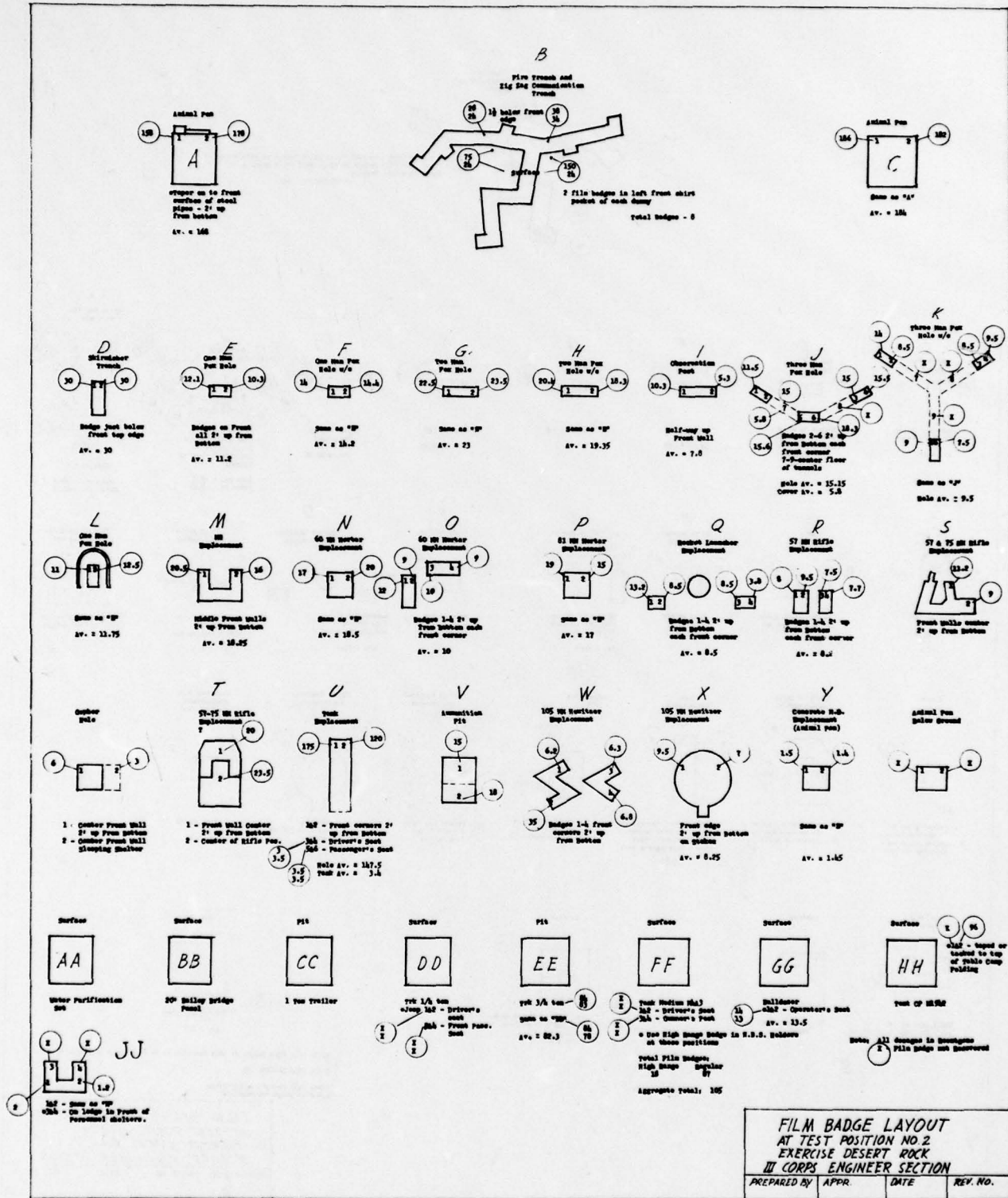
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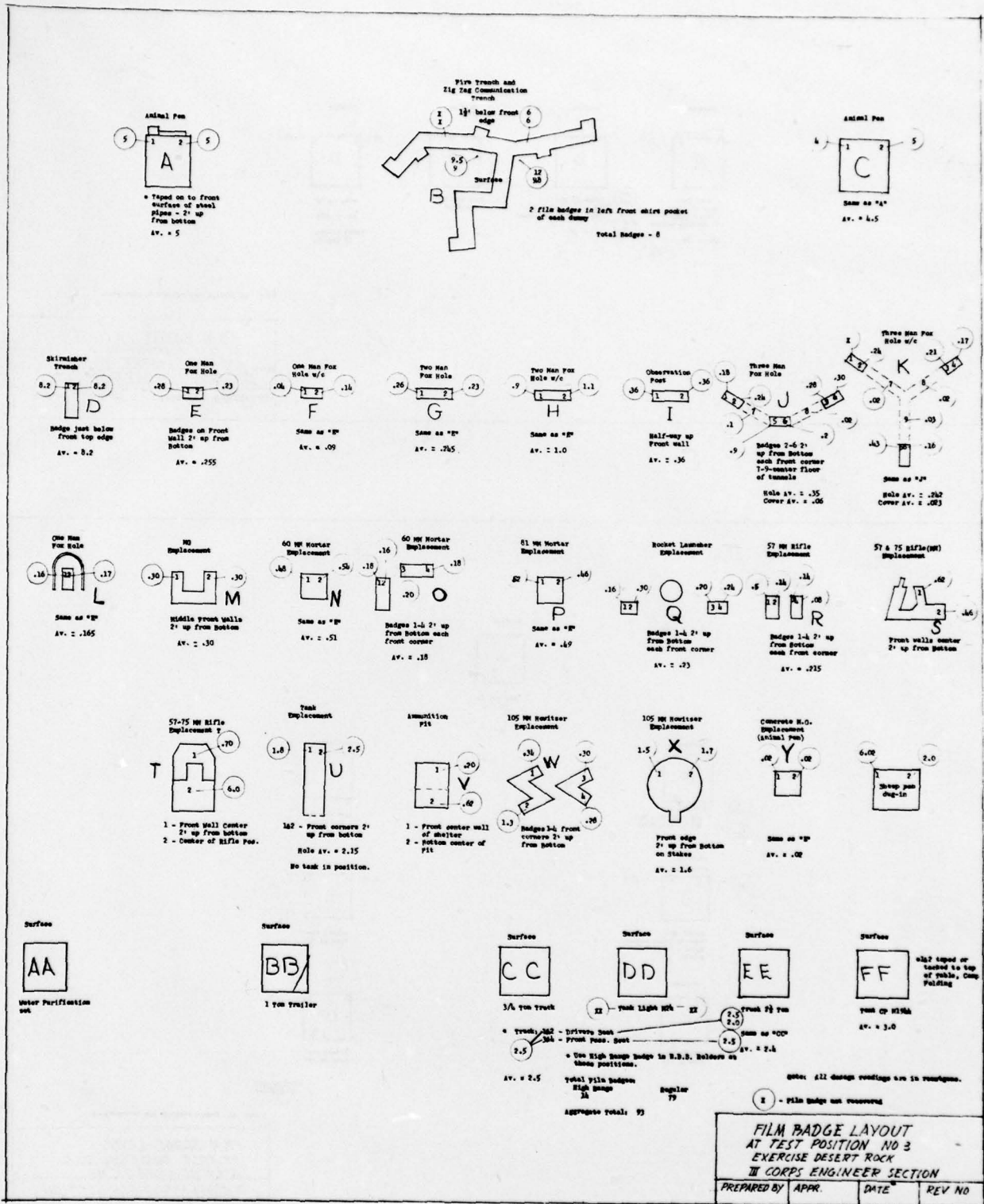
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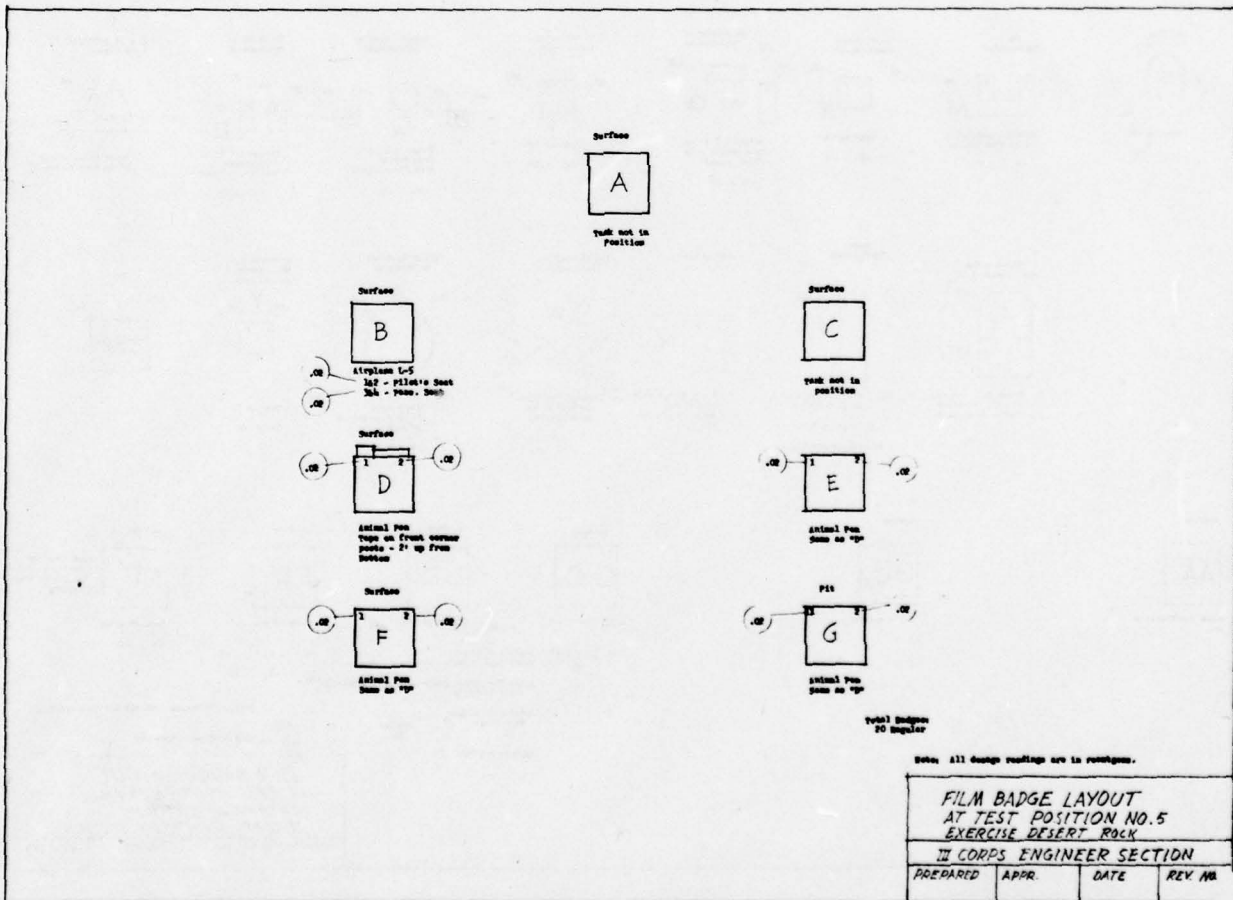
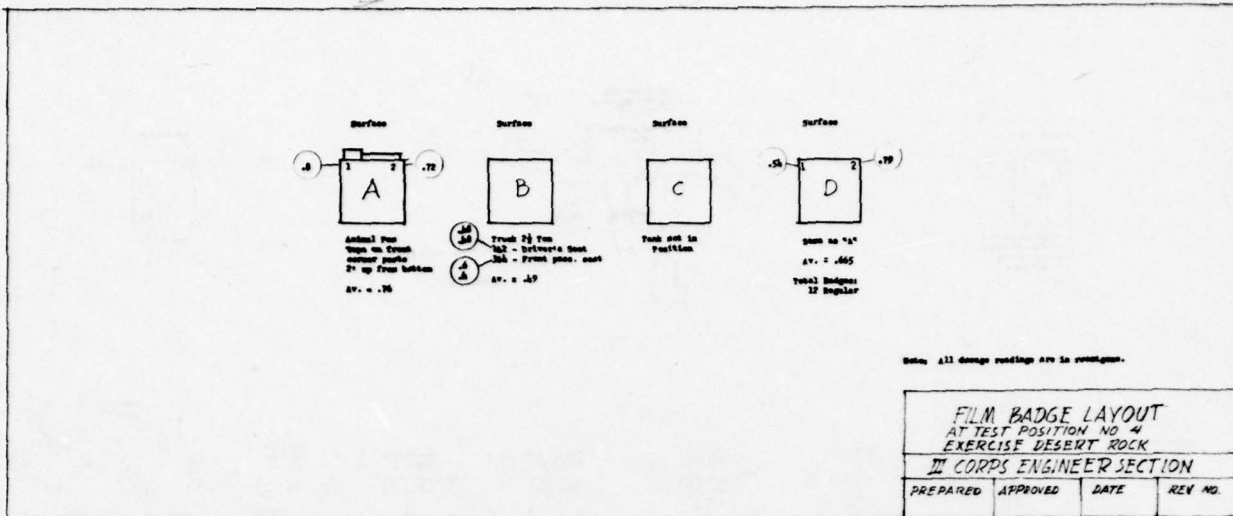






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Desert Rock Test Area  
Ground Plan



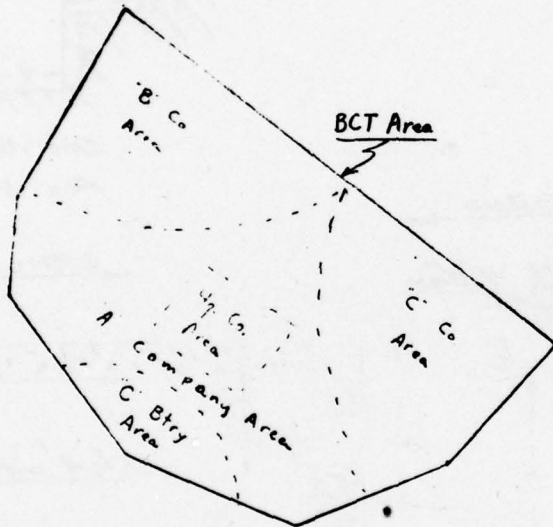
FIGURE C  
to Incl 1

Pos. 1 1000 yd

Pos. 2 1500 yd

Pos. 3 2500 yd

Pos. 4 3500 yd



Note: 'D' Co. Spread Generally  
Throughout BCT Area  
'A' Co = Bn. Reserve

LEGEND

Rt. Frt. Corner	Pos 1 = 1020 yd.	from Actual	622
" "	Pos 2 = 1520 yd	" "	" "
" "	Pos 3 = 2520 yd	" "	" "
" "	Pos 4 = 3520 yd	" "	" "
" "	BCT Area = 3870 yd	" "	" "
" "	Pos 5 = 4820 yd	" "	" "

SCALE

Pos. 5

Location of Film Badges in Typical Emplacements

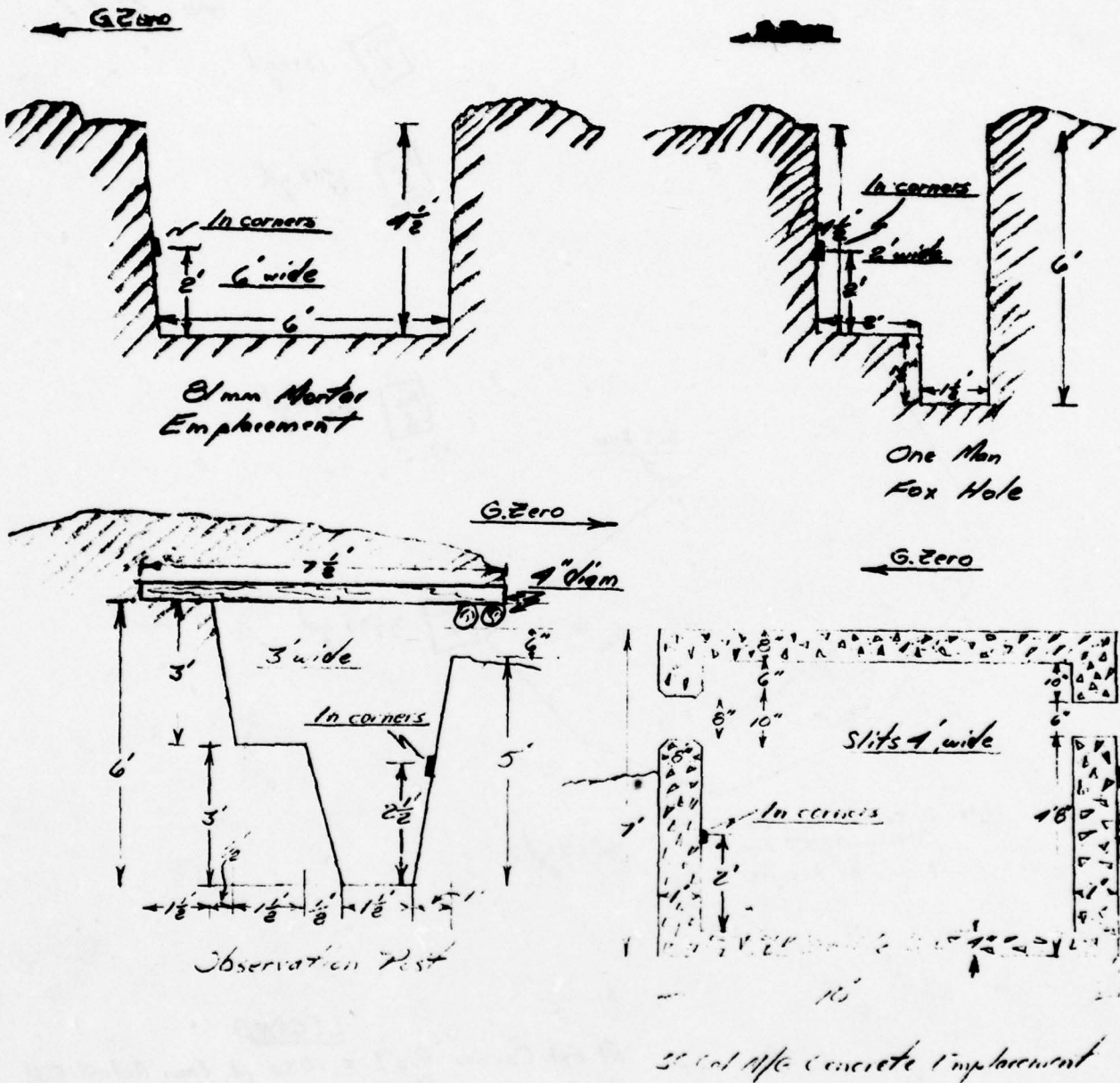


Figure B to Incl 1

TABLE C-1

FILM BADGE INSTRUMENTATION DISTRIBUTION  
EMPLOYED FOR FIELD REPLACEMENTS AND EQUIPMENT

Pos.No.	Placed in Emplacements	Picked up, Processed and Reported	Total Film Badges Placed in Emplacement	Total Film Badges Picked-up, Processed & Rptd.
1	91 (DuPont #556 in NBS Holders)	88 (DuPont #556 in NBS Holders)	91	88
2	18 (DuPont #556 in NBS Holders) 84 (DuPont #553 in Plastic Envelope)	11 (DuPont #556 in NBS holders) 77 (DuPont #553 in Plastic Envelope)	102	88
3	16 (DuPont #556 in NBS holders) 71 (DuPont #553 in Plastic Envelope)	16 (DuPont #556 in NBS holders) 71 (DuPont #553 in Plastic Envelope)	87	87
4	8 (DuPont #553 in Plastic Envelope)	8 (DuPont #553 in Plastic Envelope)	8	8
5	12 (DuPont #553 in Plastic Envelope)	12 (DuPont #553 in Plastic Envelope)	12	12
<b>Totals</b>	125 (DuPont #556 in NBS holders) 175 (DuPont #553 in Plastic Envelope)	115 (DuPont #556 in NBS holders) 168 (DuPont #553 in Plastic Envelope)	300	283

Note: "NBS" \* National Bureau of Standards, Washington, D.C.



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TABLE C-2

FILM BADGE INSTRUMENTATION DISTRIBUTION EMPLOYED FOR BCT POSITION - PERSONNEL & EQUIPMENT

*no pers. work*

Military Unit	Left in Place for Pers	Left on Equip.	Picked-up, Processed & Rptd for Pers	Picked-up, Processed & Rptd for Equip.	Total Issued per Unit	Total Picked-up Processed & Rptd/Unit	Film Badge Readings
Hq. Co	152	12	131	9	164	140	Pers: H-562mr; AV- 20 mr L- 20 mr
1st Bn							Equip: H-20 mr; AV- 20 mr L- 20 mr
188th AI							
Regt							
11th A.B.							
Div							
"A" Co	138	23	110	19	161	129	Pers: H- 78 mr; AV- 20 mr L- 20 mr
1st Bn							Equip: H- 64 mr; AV- 27 mr L- 20 mr
188th AI							
Regt							
11th A.B.							
Div							
"B" Co	155	22	120	21	177	141	Pers: H- 1500 mr; AV- 336 mr L- 20 mr
1st Bn							Equip: H- 1200 mr; AV- 341 mr L- 20 mr
188th AI							
Regt							
11th A.B.							
Div							
"C" Co	171	20	151	20	191	171	Pers: H- 1200 mr; AV- 226 mr L- 20 mr
1st Bn							Equip: H- 844 mr; AV- 274 mr L- 20 mr
188th AI							
Regt							
11th A.B.							
Div							
"D" Co	95	5	92	5	100	97	Pers: H- 1100 mr; AV- 128 mr L- 20 mr
1st Bn							Equip: H- 64 mr; AV- 40 mr L- 20 mr
188th AI							
Regt							
11th A.B. D							
Div							

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TABLE C-2 (Cont'd)

FILM BADGE INSTRUMENTATION DISTRIBUTION  
EMPLOYED FOR BGT POSITION - PERSONNEL & EQUIPMENT

Military Unit	Left in Place for Pers	Left on Equip.	Picked-up, Processed & Rptd for Pers	Picked-up, Processed & Rptd for Equip	Total Issued per Unit	Total Picked-up Processed & Rptd/unit	Film Badge Readings		
							H-High	AV-Average	L-Low
"C" Btry 546th FA Bn	112	44	107	43	156	150	Pers: H-34 mr; AV-20 mr L-20 mr	Equip: H-34 mr; AV-20 mr L-20 mr	
Totals	823	126	711	117	949	828			

Note: a. All film badges used for BGT personnel & equipment were the DuPont #553 in clear plastic envelopes.

b. For averaging purposes all lowest values 20 mr were taken arbitrarily as 0 mr.

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STUDY OF TACTICAL DOCTRINES - - OFFENSIVE AND DEFENSIVE - -  
BASED ON THE EXPERIENCES AND TESTING CONDUCTED AT  
EXERCISE DESERT ROCK (TEST NO. 1)

1. The following pages set forth statements pertaining to probable effects on troops and equipment in attack and defense formations. Only such conclusions as can actually be drawn from the Desert Rock test have been enumerated in this report.

2. Each of the formations set forth in the following pages can be tested by applying the effects template to any marked ground zero point on the diagram, or to any other given area by placing the template over the diagram. The scale of both the template and the diagrams are the same.

3. The statements contained in the following pages are predicated on the following criteria:

a. Effects of an atomic weapon are based on one yield of weapon - - that employed for Exercise Desert Rock I.

b. Conditions of topography, lack of vegetation, and weather during the test are as described in the G-2 terrain study of this report.

c. The atomic weapon employed was not detonated directly over a tactical or equipment area, nor closer than 1000 yards to these areas, since scientists and technical officers assisting the Corps Headquarters believed that sufficient statistical data was available on the results of a weapon of this yield at this distance from ground zero. Therefore, actual results from this test as to the number of casualties to troops dug in within 1000 yards and closer to ground zero have not been obtained. It can be stated, however, based on the results of this exercise, that there would be 100 per cent casualties to troops in the open extending from ground zero outward to a distance of 1500 yards. Troops well dug in, and warned of an attack from a weapon detonated directly above their position, would experience a casualty rate of less than 100 percent within a radius of 1000 yards from ground zero.

4. Additional study can be conducted by applying the effects criteria template to other formations not included within this report.

5. For detailed analysis of the effects against personnel and equipment, refer to the preceding detailed effects reports.

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DOCTRINES GOVERNING THE OFFENSE AND DEFENSE

1. In determining the effect of an atomic weapon on types of offensive and defensive formations of Division size, only an atomic weapon of the yield and height of burst employed in Exercise Desert Rock has been considered.
2. In confirming the results, a ground zero point has been selected in each case, from which, if the enemy were to employ an atomic weapon of the yield detonated in Exercise Desert Rock, maximum casualties would be experienced within a given radius.
3. In each case, a ground zero point 1000 yards forward of the front lines has also been selected. Results of the exercise indicate that troops well dug in at 1000 yards or more from ground zero are relatively safe from the blast, thermal, and radiation effects of an atomic weapon of the yield employed in Exercise Desert Rock.
4. The standard U. S. Infantry Division has been employed.
5. The following comments are made with relation to three typical Division attack formations to which the above criteria have been applied.
  - a. Infantry Division deployed for attack (annex 1).
    - (1) Division frontage - normal, 5,600 yards.
    - (2) Division depth - 3,250 yards.
    - (3) Infantry battalion attack zone - 1,400 yards.

This Division, subjected to an attack by an atomic weapon of the yield employed in Desert Rock, and attacked while in the open in this formation, the weapon detonating at ground zero point Able, Baker, or Charlie, will experience a one hundred per cent loss of three Infantry battalions from any given ground zero point up to 1500 yards from ground zero, and an additional casualty rate of 60 per cent of the personnel up to 2500 yards, and 30 per cent up to 3500 yards from ground zero, or approximately two and one-half additional Infantry battalions. Therefore, the total loss to this Division would be an equivalent of approximately five and one-half Infantry battalions. *W. 2000*

An atomic weapon employed by the enemy against this Division at ground zero points Able, Baker, or Charlie, the Division being alerted and dug in prior to launching an attack, will cause casualties of less than one hundred per cent within a radial distance of 1000 yards from ground zero. Beyond this point, troops and equipment, well dug in, while

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experiencing some losses from missiles or psychological reactions, will be subjected to minimum casualties. Therefore, under these conditions, the enemy employing only one weapon of Desert Rock yield, it is estimated that, at a maximum, two Infantry battalions would be rendered non-effective.

An atomic weapon employed in support of our forces to the immediate front of this formation in the vicinity of ground zero point Dog (1000 yards forward of the front line) employing an atomic weapon of the yield used in Desert Rock, will result in only negligible casualties to this Division when well dug in.

b. Infantry Division deployed for attack (annex 2).

- (1) Division frontage - 6,000 yards.
- (2) Division depth - 6,000 yards.
- (3) Infantry battalion attack zone - 1,500 yards.

This formation provides a frontage in the battalion and regimental zones of attack of similar width to that set forth in paragraph a. The major difference is found in the distance of the reserve unit from the two front line units.

A Division deployed in this formation, and subjected to an enemy atomic attack employing a weapon of the yield of that employed in Desert Rock, while moving forward, exposed, above ground, and receiving an attack at ground zero points Able, Baker, or Charlie, would suffer the loss of approximately three Infantry battalions within a destructive radial distance of 1500 yards and 2500 yards. Additional casualties to personnel and equipment up to 3500 yards would be experienced with an equivalent loss of approximately one Infantry battalion, or a total loss of four Infantry battalions. A detonation at ground zero points Able, Baker, or Charlie does not cause as large a number of casualties to the troops within the reserve regiment, due to its greater distance from the two forward regiments.

An atomic weapon employed by the enemy against this Division at ground zero points Able, Baker, Charlie, or Easy, the Division being alerted and dug in prior to launching an attack, will cause casualties of less than one hundred per cent within a radial distance of 1000 yards from ground zero. Beyond this point, troops and equipment, well dug in, while experiencing some losses from missiles, or psychological reactions, will be subjected to minimum casualties. Therefore, under these conditions, the enemy employing only one weapon of Desert Rock yield, it is estimated that, at a maximum, two Infantry battalions would be rendered non-effective.

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An atomic weapon of the yield employed in Exercise Desert Rock, detonated in the vicinity of ground zero point Dog, approximately 1000 yards or more forward of the front lines, will cause negligible casualties to this dug-in Division. To an enemy attacking in the open or well entrenched in this area, it can be estimated that in a radial distance of 1000 yards all enemy troops above ground will be destroyed. Those dug in within this distance will suffer less than one hundred per cent casualties. At 2500 yards from ground zero point enemy troops in the open will suffer 60 per cent casualties, and at 3500 yards at least 30 per cent casualties.

c. Infantry Division deployed for attack (annex 3).

- (1) Division frontage - 12,000 yards.
- (2) Regimental frontage - 6,000 yards.
- (3) Infantry battalion frontage - 3,000 yards.
- (4) Division depth - 6,500 yards.

This formation forces a wider frontage for each Infantry battalion and regiment, and places the reserve regiment at a greater distance to the rear. However, it is a formation which may not provide the necessary power to launch a strong attack against a determined enemy.

A Division deployed in this formation, and subjected to an enemy atomic attack utilizing a weapon of the yield employed in Desert Rock, while moving forward, exposed above ground, and receiving this attack at ground zero points Able, Baker, Charlie, or Easy would experience the loss of approximately one Infantry battalion, this battalion being rendered 100 per cent ineffective. Within the same regimental zone, additional casualties to personnel and equipment up to 60 per cent loss at 2500 yards, and 30 per cent loss at 3500 yards would cause an additional loss of approximately one and one-half Infantry battalions. The remainder of the Division, namely two Infantry regiments, would remain entirely effective with only light casualties experienced within these units.

An atomic weapon employed by the enemy against this Division at ground zero points Able, Baker, Charlie, or Easy, the Division alerted and well dug in prior to launching an attack, will result in casualties of less than one hundred per cent within a radial distance of 1000 yards, or approximately two-thirds of one Infantry battalion. Beyond this point, troops and equipment, well emplaced, will experience only minimum losses, due to psychological reactions and missiles.

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An atomic weapon of the yield employed in Exercise Desert Rock, detonated in the vicinity of ground zero point Dog, approximately 1000 yards or more forward of the front line, will have negligible effect upon the dug-in Division.

It can be concluded, therefore, that upon reaching an attack frontage of approximately 12,000 yards, the loss to be experienced by a Division attacked while in the open, with an atomic weapon the yield of that utilized in Desert Rock, is much less, due to the depth of the reserve, and the width of the front which provide sufficient distance to protect a larger number of exposed troops.

An attack by the enemy employing a number of atomic weapons at varying ground zero points, just as an attack by the enemy employing tremendous amounts of artillery and air power, would cause the Division to take cover, and stop the attack.

6. CONCLUSIONS - - OFFENSIVE DOCTRINE.

a. The overall frontage and the depth of the formation employed, coupled with the yield and the height of burst of the weapon employed by the enemy, are the key factors in determining the protection which a formation will provide against an atomic weapon utilized against our forces by the enemy.

b. Recent combat in Korea has proven many times that an Infantry Division can sustain a loss of two Infantry battalions and still remain an effective fighting force and continue to accomplish its mission. Therefore, with the facts available it appears that no major changes in offensive formations are dictated at this time. Rather, the dispersion in width and depth remains a command decision predicated upon the capability of the enemy.

c. Any major changes in offensive formations to provide absolute protection against the loss of two battalions or more from the detonation of one atomic weapon of the yield utilized in Exercise Desert Rock, would so reduce the power of the formation as to make the results of the attack extremely questionable. The desire to overextend for protection to an extent that necessary offensive power is dissipated can best be illustrated by assuming that the enemy is capable of delivering more than one weapon by air, possibly supported by some atomic artillery, which would broaden and deepen the destructive radius of the attack, and therefore cause us to further extend frontages. This accomplishes the mission desired by the enemy of weakening our attack formation to the point where it is no longer effective.

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d. It is concluded that units prepared for attack should be well dug in until the last moment. It will be desirable in some combat situations to delay development forward from the last covered position, or the last covered assembly area, until the time when enemy weapons and enemy air have been neutralized to the maximum extent possible, and the probability of atomic attack thereby lessened. Under these conditions a formation employing a narrower frontage and less depth, but more power, could be used by the commander. In this connection, development forward and attack under cover of darkness to a greater extent than now employed by our forces will afford additional protection.

7. a. The following comments are made with relation to Division defensive formations:

b. As in the case of the study of offensive doctrines, in confirming the results, a ground zero point has been selected which, if the enemy were to employ an atomic weapon of the yield detonated in Exercise Desert Rock, maximum casualties will be experienced within a given radius.

c. It is to be noted that, as in the case of offensive formations, as units are further dispersed on the ground, less personnel and materiel are rendered ineffective by a weapon of this yield. However, as units are extended on the ground, and frontages are increased, greater opportunity is provided the enemy for infiltration and for the success of his attack into our defense areas.

8. a. Infantry Division deployed for defense (annex 4).

(1) Division frontage - normal, 9,600 yards.

(2) Division depth - normal 6,400 yards.

(3) Infantry battalion frontage - 2,400 yards.

This formation is considered a normal defense formation.

An atomic weapon employed in support of our forces to the immediate front of this formation in the vicinity of ground zero point Dog (1000 yards forward of the front line), employing an atomic weapon the yield used in Desert Rock, will result in only negligible casualties to the well dug-in Division.

On the other hand, enemy troops in the open, in an attack formation, will suffer 100 per cent casualties up to 1500 yards from ground zero, and at 2500 yards will experience 60 per cent casualties, and at 3500 yards 30 per cent casualties.

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This Division, well emplaced, subjected to an attack by an atomic weapon of the yield employed at Exercise Desert Rock, will experience casualties of less than one hundred per cent within a 1000 yard radius of ground zero point Able, Baker, or Charlie, and only minimum casualties beyond the 1000 yard radius, experienced mainly from psychological reactions or missiles. This would result in the total loss of approximately two Infantry battalions to this Division.

A Division deployed in this formation will suffer its losses within all battalions of one regimental area, with the possibility of only minor casualties extending into one or more of the battalion areas of the other regiments.

b. Infantry Division deployed for defense (annex 5).

- (1) Division frontage - 15,500 yards.
- (2) Division depth - 10,000 yards.
- (3) Battalion defense areas - 3,500 yards by 1,500 yards.

This formation provides greater passive defense against enemy weapons, including atomic weapons, by deploying troops on the battle field at greater distances.

An atomic weapon employed in support of our forces to the immediate front of this formation in the vicinity of ground zero point Easy (1000 yards forward of the front line) will result in only negligible casualties to this Division when well dug in.

Enemy troops, in the open, in attack formation, will experience one hundred per cent casualties within 1500 yards of ground zero points Able, Baker, Charlie, or Easy, and casualties up to 60 per cent within 2500 yards of ground zero, and 30 per cent up to 3500 yards from ground zero.

A Division in this formation, well dug in and alerted, receiving an attack by an atomic weapon of the yield employed in Exercise Desert Rock, in the vicinity of ground zero points Able, Baker, Charlie, or Dog, will experience casualties of less than one hundred per cent up to a distance of 1000 yards from ground zero. Beyond this point, only minor losses in troops or equipment will be experienced. This would result in a total loss to the Division of approximately two-thirds of one Infantry battalion within any one of the three regimental defense areas.

Due to the dispersion of the troops within the battalion areas, and the depth of the Division, a proportionately smaller loss within each battalion and regimental defense area will be experienced when troops are employed in this formation.



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c. Infantry Division deployed for defense - Cannae formation (Annex 6).

- (1) Division frontage - 17,000 yards.
- (2) Division depth - 12,000 yards.
- (3) Battalion area, 3,500 by 1,500 yards.

This formation was utilized in Exercise Desert Rock as the basis of the assumed tactical formation. It was not possible to utilize the battalion frontage of 3,500 yards due to the limitations of the terrain available within the test site. However, results gained from the test indicate that an Infantry battalion utilizing an approximate 3,500 yard front is well protected from an atomic weapon of the yield employed in Exercise Desert Rock, when dug in 3,500 yards from ground zero.

An atomic weapon employed in support of our forces to the immediate front of this formation in the vicinity of ground zero point Charlie (1000 yards forward of the front line) will result only in negligible casualties to this Division when well dug in.

Enemy troops in the open, in attack formation, will experience one hundred per cent casualties within 1500 yards of ground zero points Able and Baker, and casualties up to 60 per cent within 2500 yards of ground zero, and 30 per cent up to 3500 yards from ground zero.

An attack against troops deployed in this formation, and well dug in, employing an atomic weapon of the yield of that employed in Exercise Desert Rock, in the vicinity of ground zero points Able or Baker, would result in casualties of less than one hundred per cent within 1000 yards of ground zero, with only minimum casualties to be expected to personnel and materiel, well dug in beyond this point. This would cause a loss of from three-fourths up to one Infantry battalion.

In considering this particular formation, study was given to the casualties which it was expected would be inflicted upon the enemy at a ground zero point 7000 yards to the front (point Dog) as established in the original study of this formation. The enemy in the open, above ground, deployed in an attack formation, would take up to 100 per cent casualties within 1500 yards of ground zero and 60 per cent casualties within 2500 yards of ground zero. Casualties up to 30 per cent would be inflicted at 3500 yards from ground zero. It can be readily observed that there is a belt of 2500 yards in width between the destruction area of the weapon detonated at point Dog and the line of contact, wherein the enemy would experience either very minor casualties or none at all. Therefore, a large enemy force in contact with our troops, which would be well beyond 3500 yards from the ground zero points, would not be destroyed.

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There is, therefore, a requirement for a weapon of a yield larger than that employed at Exercise Desert Rock, or for a number of smaller atomic weapons, delivered by artillery and air in order to achieve the results desired, once the enemy has been maneuvered into the vulnerable position within the front of this formation. While these results are not conclusive, it appears that the use of a number of smaller weapons is desirable.

d. Infantry Division deployed for defense (annex 7).

- (1) Division frontage - 19,300 yards.
- (2) Division depth - 11,000 yards.
- (3) Basis for deployment - Arbella maneuver.
- (4) Battalion area - 3,500 yards by 1,500 yards.

An atomic weapon of the Desert Rock yield, employed in support of our forces to the immediate front of troops well emplaced in this formation in the vicinity of ground zero point Charlie (1000 yards forward of the front line), will result in only negligible casualties to this Division.

Enemy troops in the open, forward of this position in the vicinity of ground zero point Charlie, or at other points to the front of our troops, would experience casualties up to 100 per cent within a 1500 yard radius of this ground zero point, up to 60 per cent 2500 yards from ground zero, and up to 30 per cent 3500 yards from ground zero.

An Infantry Division deploying for defense in the Arbella or wedge formation, receiving an attack by an atomic weapon of the yield of that utilized in Desert Rock, at ground zero points Able or Baker, would experience casualties of less than 100 per cent, to a radius from ground zero of 1000 yards. Beyond this point, only minimum casualties can be anticipated. The total loss to this Division would be from two-thirds up to one Infantry battalion.

It can, therefore, be concluded that one atomic weapon of this size would not cause any serious effect to our forces deployed in this formation.

e. Infantry Division deployed for defense (annex 8).

- (1) Division frontage - 20,000 yards.
- (2) Division depth - 16,000 yards.
- (3) Battalion combat areas 5,000 yards by 3,000 yards with all arms integrated for local defense.

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An atomic weapon employed in support of our dug-in forces to the immediate front of this formation in the vicinity of ground zero point Charlie (1000 yards forward of the front line), employing an atomic weapon of the yield used in Desert Rock, will result in only negligible casualties to this Division.

Enemy troops in the open, in attack formation, will suffer casualties up to 100 per cent within 1500 yards of ground zero, up to 60 per cent 2500 yards from ground zero, and up to 30 per cent 3500 yards from ground zero.

By detonating an atomic weapon of the Desert Rock yield at ground zero points Able or Baker, or similar ground zero points within a battalion area, casualties of less than 100 per cent will be experienced at ground zero and at a radial distance from ground zero outward to 1000 yards. Troops in this formation will experience a loss of from two-thirds up to one Infantry battalion, when well dug in and alerted, with a minimum number of additional casualties, extending outward from 1000 yards. These casualties will be taken in only one battalion area per weapon of the size employed in Exercise Desert Rock.

This formation, then, provides almost maximum protection for our troops on the battle field against an atomic weapon of the Desert Rock yield. However, due to its wide frontages, the strength of the defense has been materially weakened.

Therefore, to achieve decisive results, a weapon of considerably greater yield will be required, or a number of smaller weapons with ground zero points so placed that their destructive radius covers all vital enemy areas. This thought can best be illustrated by visualizing atomic artillery covering those areas in front of our forward positions, supplemented by close air support attacking with small atomic weapons, at greater depth.

Assuming that the threat of an atomic attack has caused the enemy to deploy in a formation similar in frontage and depth, more than one weapon of the yield employed in Exercise Desert Rock, or a number of smaller atomic weapons delivered by artillery and tactical air must be utilized in order to achieve decisive results. Again, it would appear that a number of smaller weapons is the more desirable solution.

#### 9. CONCLUSIONS - - DEFENSIVE DOCTRINES.

a. As the width and depth of battalion and larger sized units are extended on the battle field, the overall width and depth of the desirable defensive formation is also extended. As is true in the offensive, the desired width and depth of the formation, coupled with the yield and the height of burst of the weapon employed by the enemy (assuming that troops are well dug in), are the key factors in determining protection which a formation will provide against an atomic weapon utilized against



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our forces. Over-dispersion to a point where the defensive formation itself becomes so weak as to allow successful enemy infiltration and attack, nullifies the use of the information.

b. An atomic weapon of the yield employed in Exercise Desert Rock does not, itself, provide the necessary destructive power to destroy an Infantry Division well dug in and dispersed. Either weapons of a larger yield must be employed for this purpose, or a number of weapons of smaller yield, delivered by our own atomic artillery, supplemented by short-range guided missiles and tactical air are required.

c. The commander on the ground must weight these factors and choose a formation which will provide the necessary depth and power to accomplish the defense mission, at the same time offering only a minimum target to the enemy.

d. Both the Arbela and the Cannae formations are well adapted for our use in conjunction with the tactical employment of atomic weapons. This is true whether it is applied to a Division formation or to a Corps deployed for defense. However, a weapon of considerably greater yield will be required, or a number of smaller weapons with ground zero points so placed that the destruction radius covers all enemy areas are necessary, provided thoroughly decisive results are to be obtained by use of these or other formations.

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CONCLUSIONS

1. In approaching problems pertaining to the employment of atomic weapons, difficulty was experienced by III Corps by not having sufficient atomic data available to it, during the planning phase.
2. Trained and alerted troops evidenced no unusual psychological reaction to this atomic detonation.
3. An atomic weapon of the yield employed in Exercise Desert Rock and detonated at a similar height will cause very few, if any, casualties beyond 1000 yards from ground zero, when personnel and equipment are well dug in on the battle field, and alerted to a possible attack.
4. Troops in the open, such as in attack formations, within 1500 yards of ground zero, will be rendered totally ineffective, troops 2500 yards from ground zero will be 60 per cent ineffective, and troops 3500 yards from ground zero will be 30 per cent ineffective.
5. Dispersion of personnel and individual pieces of equipment, well emplaced field fortifications, and alternate methods of communication and control must be stressed at all echelons.
6. Combat operations would not have been materially hampered owing to equipment, materiel or fortification damaged, further than 1000 yards from ground zero. The test proved that equipment at:

<u>Distance from Zero</u>	was	<u>Per Cent Serviceable</u>
1000 yards		81%
1500 yards		86%
2500 yards		93%
3500 yards		100%

7. Ammunition emplaced with troops in normal emplacements will, with few minor exceptions, be serviceable. No change in ballistics effects were noted.
8. Troops can operate within the area of ground zero immediately following the detonation of the atomic weapon with only minimum protective measures required.
9. The Chemical, Biological, Radiological personnel presently provided for in tables of organization and equipment are required. This personnel with instruments must be utilized to serve as Monitors at the head of all columns passing through contaminated areas.

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10. Physical protective measures currently employed by our forces are adequate, to include normal field fortifications, revetments of all types, and present types of military equipment. However, since most of the casualties in combat incurred at distances greater than 1500 yards from ground zero will be caused by thermal radiation, research and development should be conducted to provide clothing which will give maximum protection from the thermal effects.

11. No changes in established offensive and defensive doctrines are indicated at this time. The width and depth of the formation in conjunction with the height of the burst and the yield of the weapon are key factors in determining the effects of the weapon and the type of formations to be used by the commander.

12. In the tactical employment of the weapon, target analysis has become increasingly important in order to advise a commander when a profitable target exists for the employment of an atomic weapon.

13. In order that commanders at division and higher levels can select formations which afford the width and depth desirable in consideration of the situation with which they are confronted, additional tests must be conducted from which definitive conclusions can be drawn as to the effectiveness of our current formations and doctrines.

14. While this one test does not justify definite conclusions, it is believed that a large atomic weapon is not best suited for tactical support. It is more difficult to deliver than a smaller one and a portion of the destructive area is wasted due to lack of profitable targets. A number of smaller weapons delivered by artillery and tactical air can be so detonated that the critical areas can be saturated without creating major dead spaces. Further tests must be conducted in order to determine what the characteristics of these smaller weapons must be in order to accomplish the desired results.

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RECOMMENDATIONS

1. That all available data on the characteristics and employment of atomic weapons, which is now available within all of the testing agencies, be given a much wider and more expeditious dissemination than it is currently receiving within the armed forces.
2. That all military personnel be indoctrinated as rapidly as possible with information of the effects of atomic weapons on military formations, units, personnel and equipment, in order that widespread misconceptions as to the use and result of atomic weapons will be overcome.
3. That SOP's be established as rapidly as possible for all units standardizing the action to be taken by our forces when the enemy employs an atomic weapon, as well as procedures which troops will follow when atomic weapons are employed in support of our tactical troops.
4. That more stress be placed in our troops training on field fortifications.
5. That all Chemical, Biological, Radiological personnel presently provided for in Tables of Organization and Equipment be trained in the use of radiological survey instruments and in their duties as Monitors.
6. That in conjunction with further testing, definite determination must be made as to the radiation dosage which will be accepted for combat troops which, with a calculated number of casualties, will allow our troops to continue to operate effectively.
7. That staff and command doctrine be perfected as rapidly as possible to further the employment of the atomic weapon on the battlefield in support of ground troops.
8. That the offensive employment of atomic weapons encompass plans for the use of a number of atomic weapons simultaneously, which will completely saturate the target area when integrated into the commander's coordinated plan of preparatory and supporting fires.
9. That no change in established doctrines, either offensive or defensive, be made at this time.
10. That no major changes be made at this time to the organization of the Infantry Division, based on the use of the atomic weapon by the enemy.
11. That every opportunity be taken to conduct further tests under simulated combat conditions of specific types of formations and all types of military clothing and equipment, employing atomic weapons of varying yields and methods of employment from the family of weapons, in order to further corroborate known effects data.

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12. That necessary research and development be conducted in order to provide protective clothing which will offer as much protection as possible to personnel from the thermal effects of an atomic weapon.

13. That further tests be conducted as specified by the Army, and not as laid down under Atomic Energy Commission test conditions. These tests to determine the specifications for the type of weapons which will be most effective to support ground troops in a tactical operation. That smaller atomic weapons suitable for tactical use be considered and developed, which can be delivered by artillery, short-range guided missiles and tactical air under control of the Army.

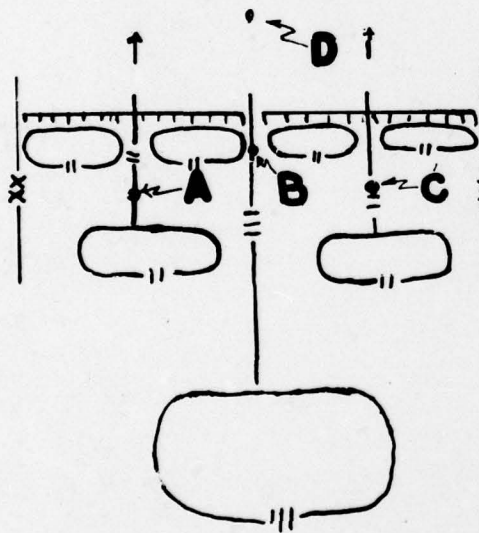
14. That a decision be reached at the highest level which will definitely enunciate the principle that the Army will be responsible to dictate its requirements in atomic weapons, with the Atomic Energy Commission being directed to experiment, manufacture, test and lend assistance to the Army in developing standard weapons which best provide tactical support for ground troops. This requirement should be expedited to the utmost.

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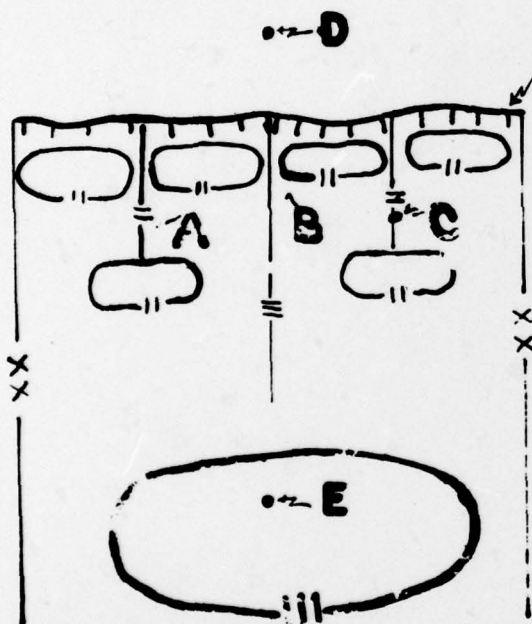


**INFANTRY DIVISION DEPLOYED FOR ATTACK**  
**DIV FRONTAGE - 5,600 YDS**  
**DIV DEPTH - 3,250 YDS**  
**INF BN ZONE - 1,400 YDS WIDE**



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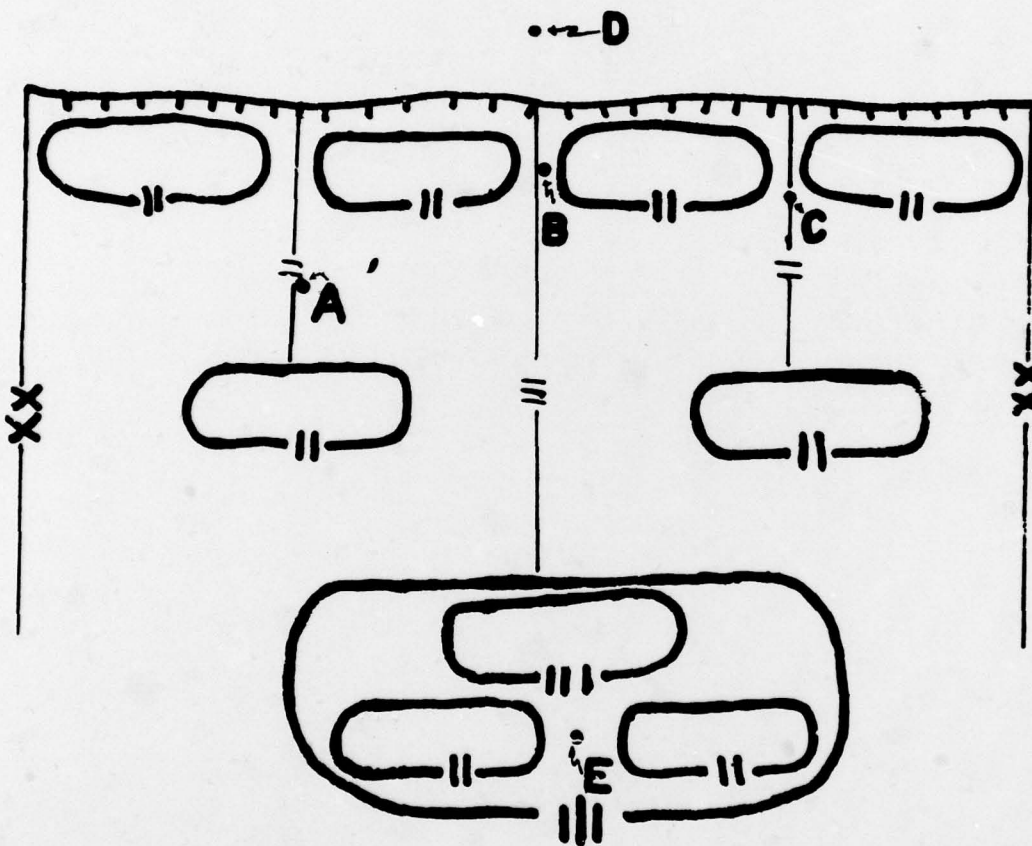
**LINE OF DEPARTURE**

**INFANTRY DIVISION DEPLOYED  
FOR ATTACK**

**SCALE: 7" = 10,000 YDS**  
**DIVISION FRONTAGE - 6,000 YDS**  
**DIVISION DEPTH - 6,000 YDS**  
**BASIS FOR DEPLOYMENT -**  
**FM 7-40 INF REGT**  
**INF BN ZONE - 1500 YDS WIDE**  
**INF REGT ZONE - 3000 YDS WIDE**

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**INFANTRY DIVISION  
FOR ATTACK  
SCALE: 7" = 10,000  
DIVISION FRONTAGE  
DIVISION DEPTH  
BN FRONTAGES**

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**DIVISION DEPLOYED**

**ATTACK**

**10,000 YDS**

**FRONTAGE - 12,000 YDS**

**DEPTH - 6,500 YDS**

**RES - 3,000 YDS**

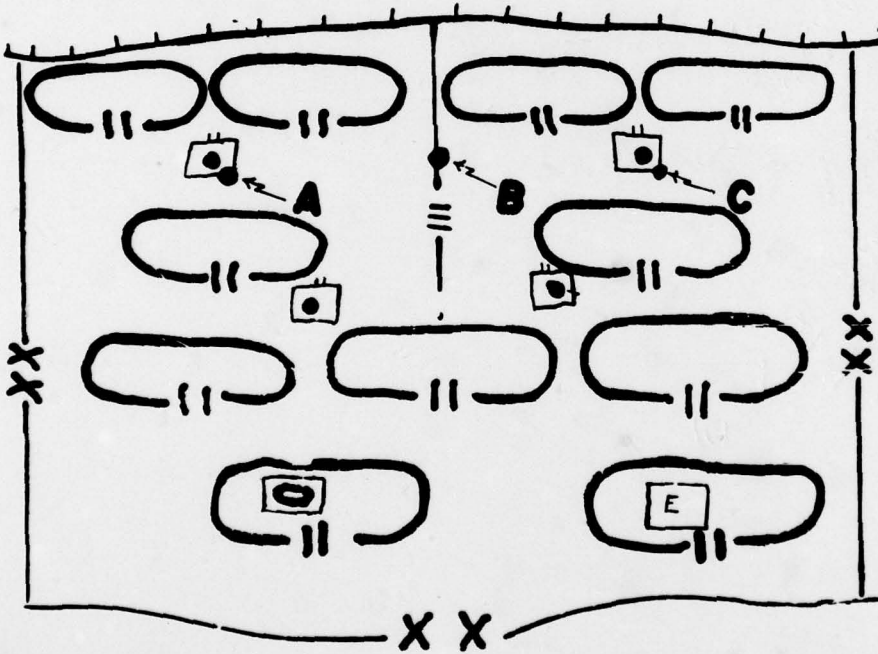
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INFANTRY DIVISION DE  
 FOR DEFENSE  
 SCALE: 7" = 10,000 Y  
 DIV FRONTAGE - 9,600  
 DIV DEPTH - 6,400  
 BASIS FOR DEPLOYMENT  
 FM 7-40 INF  
 BN AREAS 2400 X 1000

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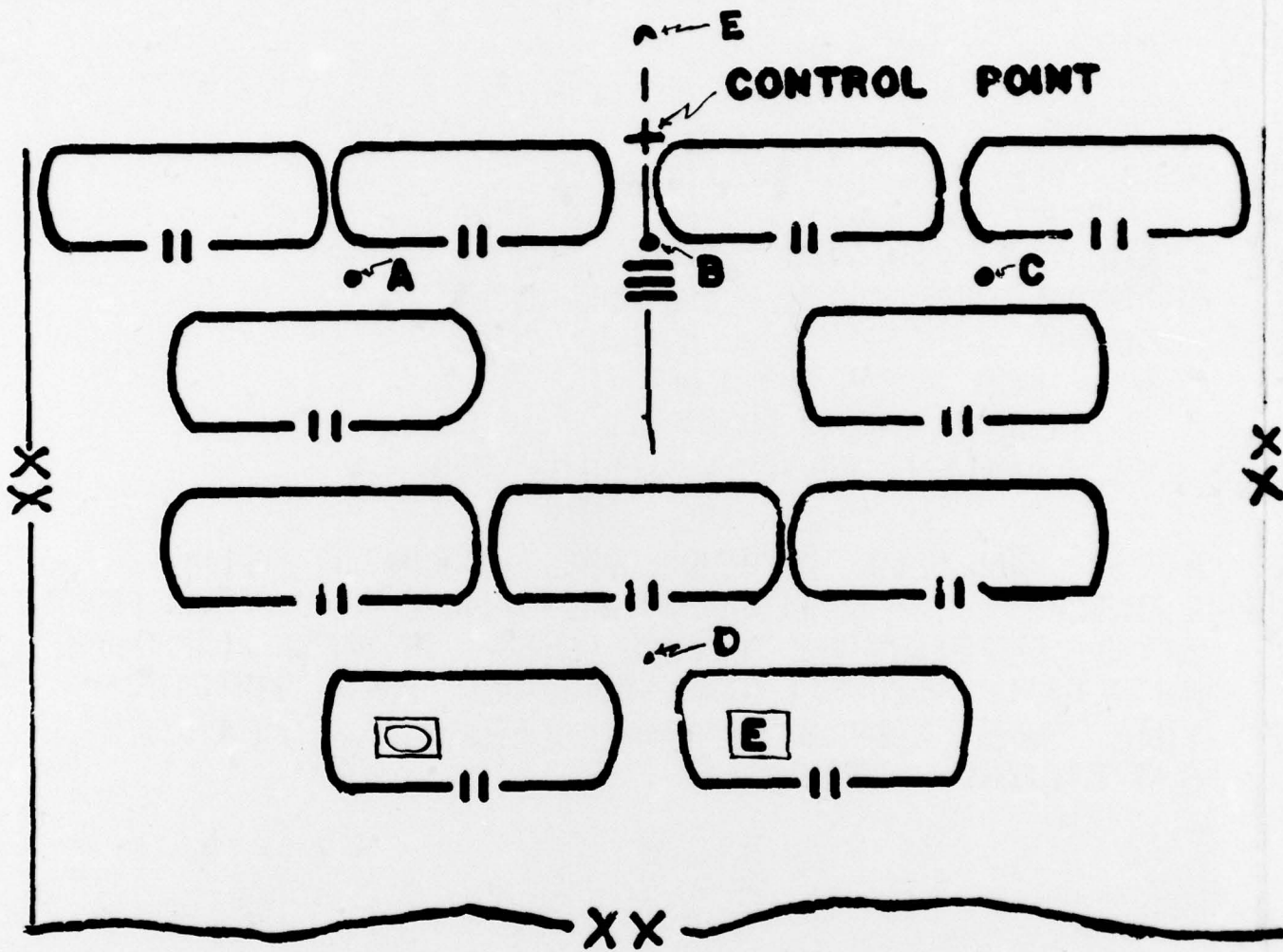
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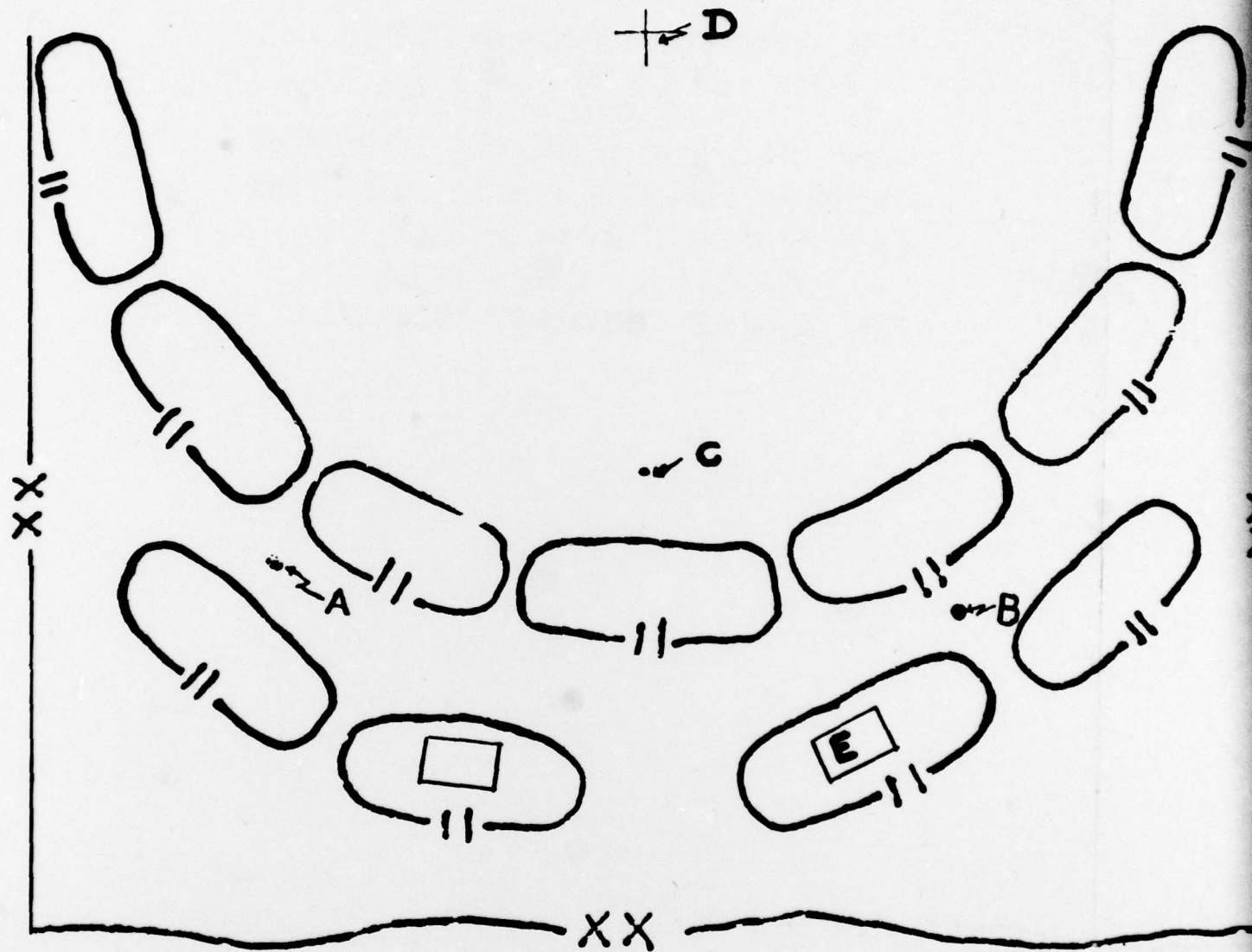
**INFANTRY DIVISION DEPLOYED  
FOR DEFENSE  
SCALE: 7" = 10,000 YDS  
DIVISION FRONTAGE - 18,500 YDS  
DIVISION DEPTH - 10,000 YDS  
BASIS FOR DEPLOYMENT -  
2 REGTS UP, 1 BACK  
BN AREAS 3500 X 1500 YDS**

**NOTE: UNLESS OTHERWISE INDICATED THE  
SYMBOL CONTAINS AN INFANTRY BATTALION  
WITH SUPPORTING TANKS AND HEAVY MORTARS.  
ARTILLERY BATTALIONS ORGANIC AND SUPPORT-  
ING ARE EMPLACED IN REARMOST INFANTRY  
BATTALION AREAS.**

2

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6.

**INFANTRY DIVISION DEPLOYED  
FOR DEFENSE**

**SCALE: 7" = 10,000 YDS**

**DIVISION FRONTAGE - 17,000 YDS**

**DIVISION DEPTH - 12,000 YDS**

**BASIS FOR DEPLOYMENT—**

**CANNAE MANEUVER**

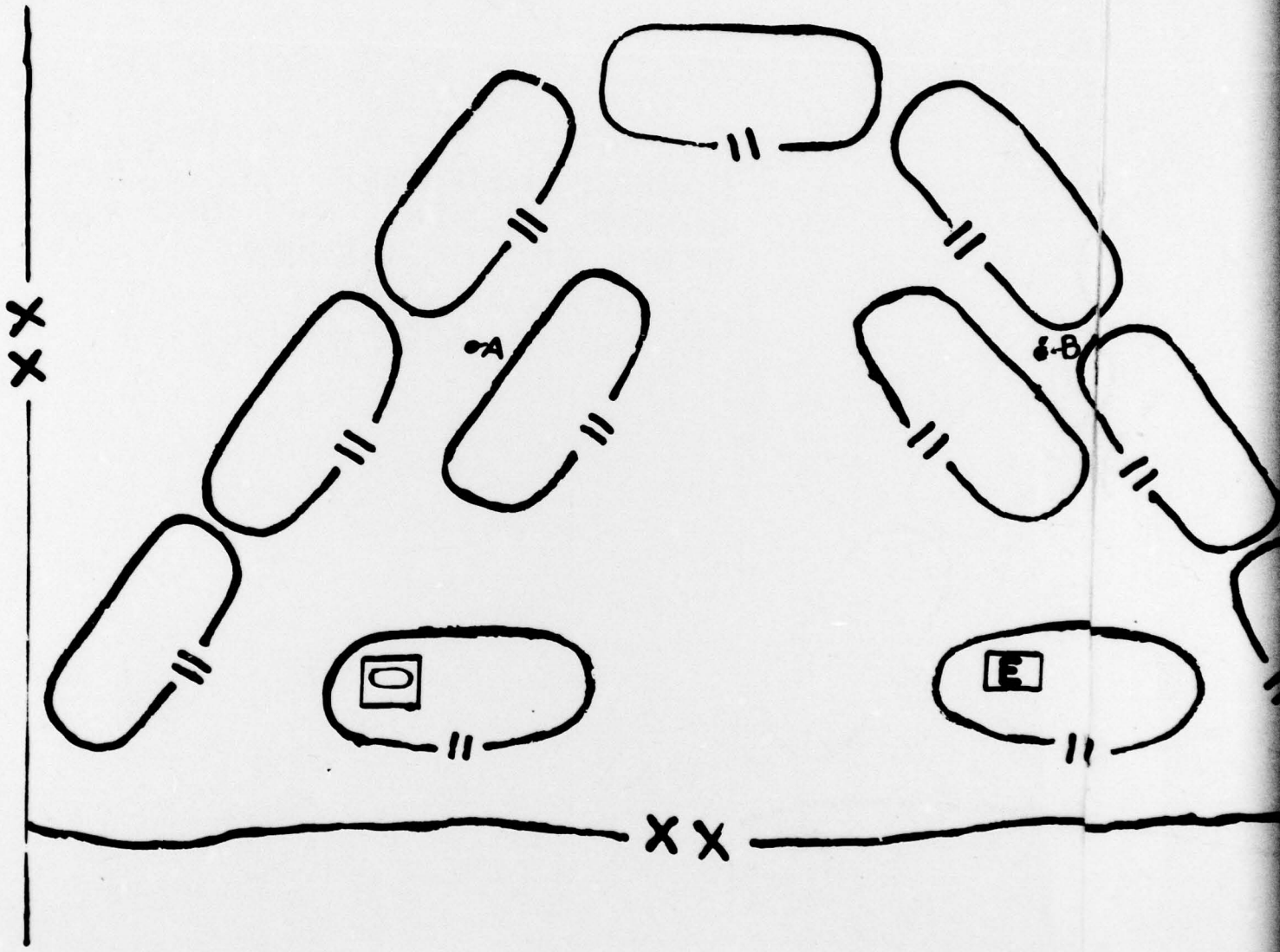
**BN AREAS 3500 X 1500 YDS**

X  
X

2



+ ← C



7.

**INFANTRY DIVISION DEPLOYED  
FOR DEFENSE**

**SCALE 7" = 10,000 YDS**

**DIVISION FRONTAGE - 19,300 YDS**

**DIVISION DEPTH - 11,000 YDS**

**BASIS FOR DEPLOYMENT -**

**ARBELA MANEUVER**

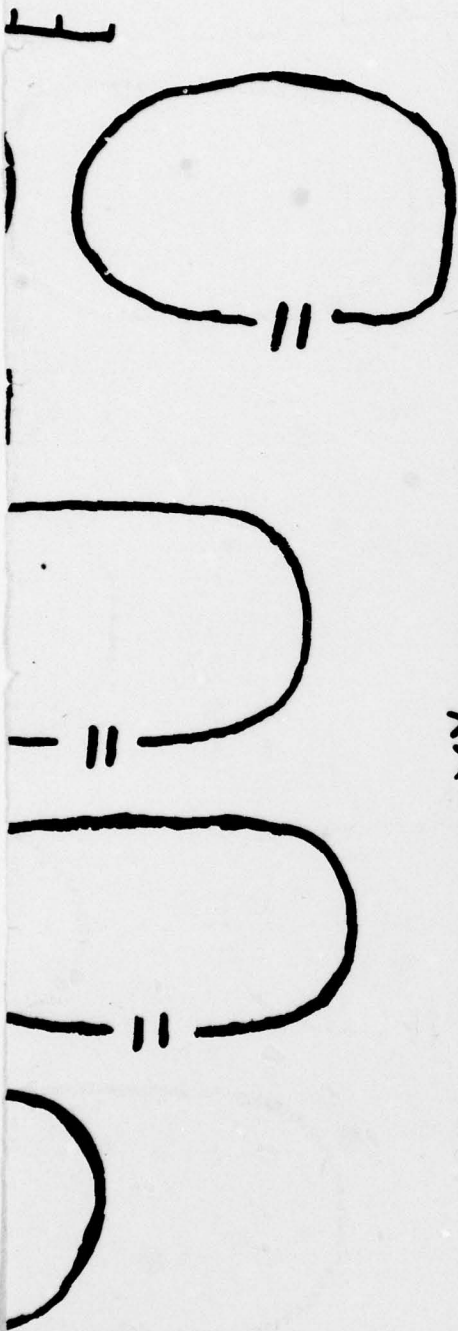
**BN AREAS 3500 X 1500**

X  
X



2

8.



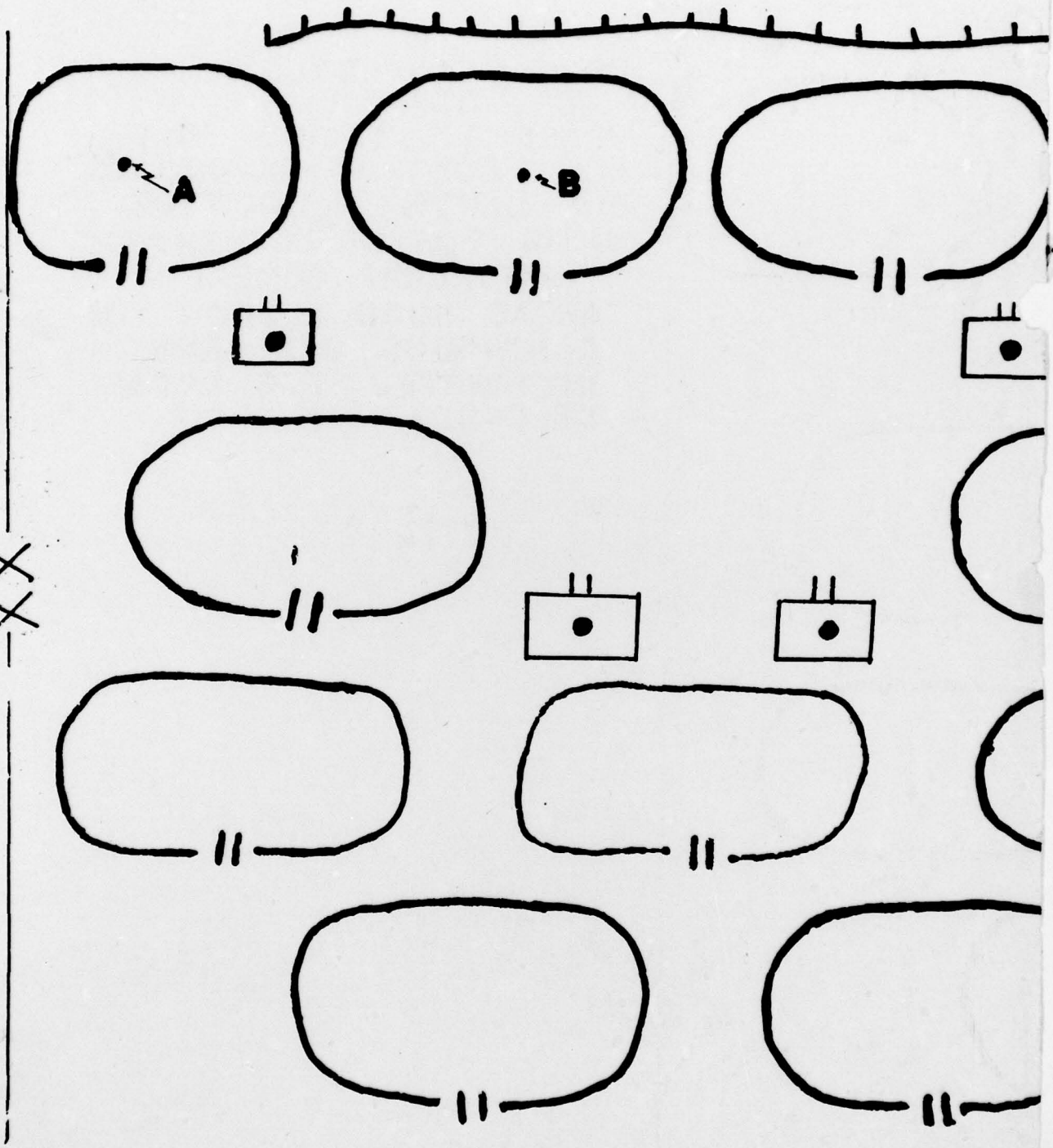
INF DIV DEPLOYED  
FOR DEFENSE  
SCALE: 7" = 10,000 YDS  
DIV FRONTAGE - 20,000 YDS  
DIV DEPTH - 16,000 YDS  
BASIS FOR DEPLOYMENT  
BATTALION COMBAT  
AREAS 5000 X 3000 YDS  
CONTAINING ALL ARMS  
INTEGRATED FOR LOCAL  
DEFENSE



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