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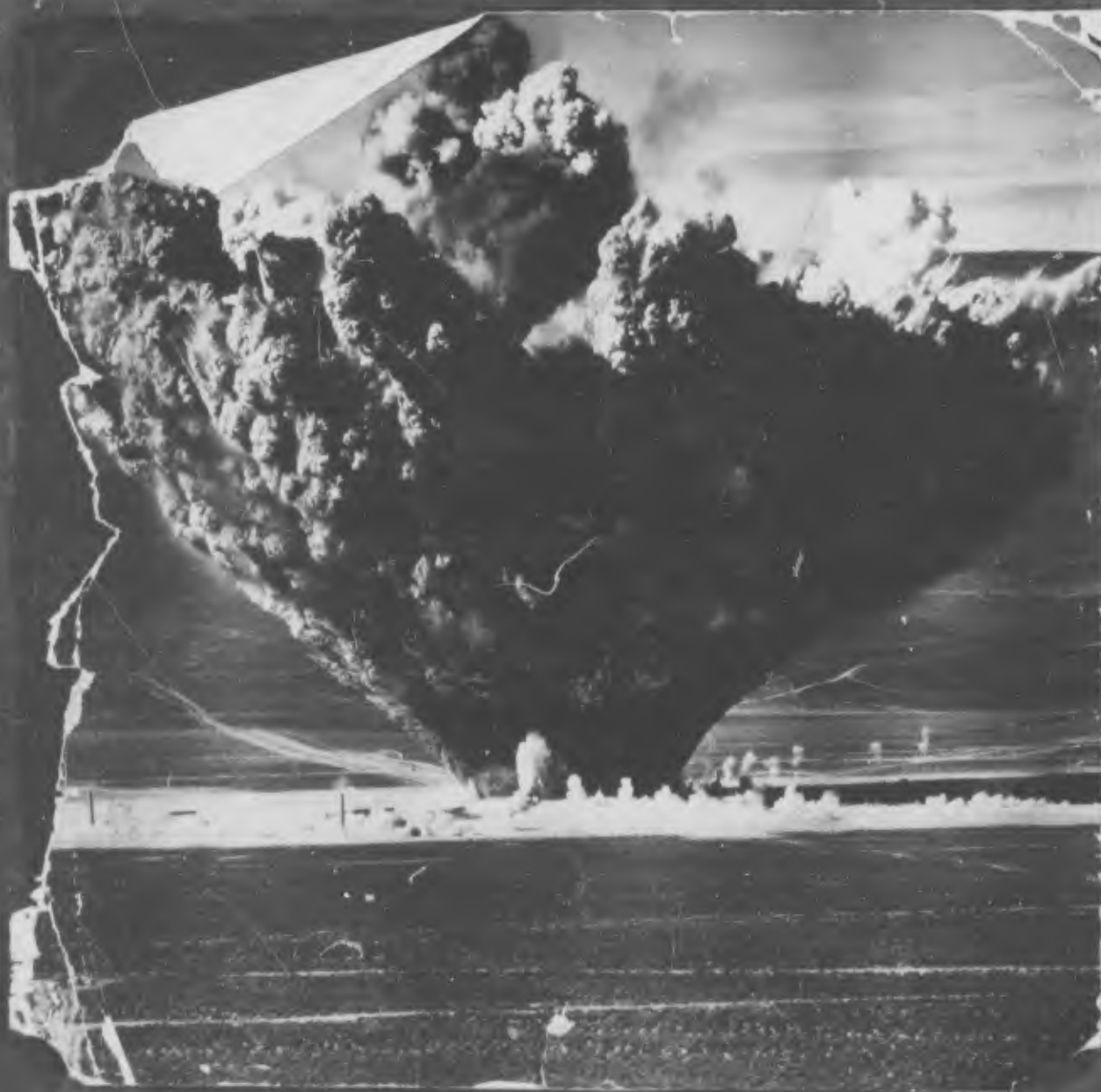
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REPORT of TEST
EXERCISES
Desert Rock II and III



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GENERAL PLAN

OCT 15 1975

Exercises Desert Rock II and III



changed into Red Bn. 1a hrs 51

Headquarters Camp Desert Rock

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255 p (9c) 7/5/54

THIS DOCUMENT CONSISTS OF 256 PAGE(S)
NO. 10 OF 12 COPIES, SERIES A

Part I

2-2371

HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

15 December 1951

SUBJECT: Report of Exercises Desert Rock II and III

10329
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TO: Commanding General
Sixth Army
Presidio of San Francisco, California

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of the

ARMED FORCES

SPECIAL WEAPONS PROJECT

1. Reference: Letter, this Headquarters, to Commanding General, Sixth Army, Subject: Report of Activities, Camp Desert Rock, dated 15 December 1951.

2. Submitted herewith is the Report of Exercises Desert Rock II and III in nine (9) copies.

3. This report is complete except as noted below. Action has been taken to obtain the following information which should be added to this report by the recipient of each copy of the report:

- a. Weapon effects data on ground accelerations and displacement.
- b. Scaling law information required to scale the effects up to the size of operational weapons.

Data relative to a. and b. above have been requested from the Chief, Armed Forces Special Weapons Project, Washington, D. C. (See Inclosure 10).

c. "Before" and "After" photos of equipment, materiel, and emplacements for Desert Rock III. Action has been taken to procure these photos, by letter to Mr. Carroll L. Tyler, Test Manager, United States Atomic Energy Commission. (See Inclosure 11).

d. Further, detailed evaluation of damage at position 1 (100 yards) and position 2 (200 yards) is required to supplement the limited assessment of those positions, which was made for this report. Action has been taken to complete this evaluation, as indicated in letter, this Headquarters, to Commanding General, Sixth Army, Subject: Operation Desert Rock III, dated 5 December 1951.

4. This report, as written, requires a classification of "Secret - Restricted Data." It is recommended that those parts of the report which are of general, important interest to the Army be reviewed by Department

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SUBJECT: Report of Exercises Desert Rock II and III 15 December 1951

of the Army with a view toward downgrading their classification in order to facilitate wide distribution to the several agencies requiring this information.

5. a. In order to expedite the procurement of the information indicated in paragraph 3a and b. above, distribution has been made of three (3) advance copies of this report to the representatives of the following agencies, who had major responsibilities in the preparation of the report:

Copy 10 Chief, Armed Forces Special Weapons Project
Washington 25, D. C.
(ATTN: Major Thomas A. Gibson, Jr.)

Copy 11 Commanding General, Field Command
Armed Forces Special Weapons Project
Sandia Base, New Mexico
(ATTN: Lt Col R. K. Brunsvoold)

Copy 12 Director of Effects Tests Group
Technical Operations Squadron (Prov)
Kirtland Air Forces Base, New Mexico
(ATTN: Colonel Max S. George)

b. Recommended distribution of the remaining copies of this report is as follows:

Copies 1 - 5 Commanding General, Sixth Army
Presidio of San Francisco, California
(with appropriate copies to Department of the Army
and to Army Field Forces.)

Copy 6 Commanding General, III Corps
Fort MacArthur, California

Copy 7 Chief, Armed Forces Special Weapons Project
Washington 25, D. C.

Copy 8 Commanding General, Field Command
Armed Forces Special Weapons Project
Sandia Base, New Mexico

Copy 9 Commanding Officer, III Corps Artillery
Fort Lewis, Washington

11 Inclosures

1. - 9. 9 copies

"Report of Exercises Desert Rock II and III"
Classified "Secret - Restricted Data."

B. M. FITCH
Brig Gen, USA
Commanding

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SUBJECT: Report of Exercises Desert Rock II and III 15 December 1951

10. Copy of Letter, Hq Camp Desert Rock to Chief, AFSWP
Classified "Secret - Restricted Data."
11. Copy of Letter, Hq Camp Desert Rock to Mr. Carroll L. Tyler
Classified "Confidential."

Copy (less inclosures) to:
Chief, AFSWP
Mr. Tyler

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

14 December 1951

SUBJECT: Request for Weapon Effects Data

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

TO: Chief, Armed Forces Special Weapons Project
P. O. Box 2610
Washington 25, D. C.
ATTN: (Weapon Effects Division)

1. Certain items of effects information are essential in order to finalize the reports of Exercises Desert Rock II and III. The necessary information falls into two categories:

- a. Information required to complete the present report.
- b. Information required to re-evaluate the report in terms of the yields of the actual operational weapon.

2. The information required with reference to paragraphs 1a and 1b above is as follows:

- 1. Reference paragraph 1a above:
 - (1) Surface shot information.
 - (a) Maximum horizontal and vertical transient ground displacements, as a function of distance.
 - (b) Ground acceleration, as a function of distance.
 - (2) Underground shot information.
 - (a) Maximum horizontal and vertical transient ground displacements, as a function of distance.
 - (b) Ground acceleration, as a function of distance.

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SUBJECT: Request for Weapon Effects Data [REDACTED] 11 December 1951

(c) Total dose contours of the contaminated area.

b. Reference paragraph 1b above:

Scaling laws for the various weapons effects, for both underground and surface bursts.

3. It is requested that the information indicated in paragraph 2 above be sent to the Commanding General, Sixth Army, Presidio of San Francisco, California, (ATTN: AC of S, G3), as soon as it is available. It is further requested that the Commanding General, Sixth Army, be advised in advance of the estimated availability dates of the information requested.

B. M. FITCH
Brig Gen, USA
Commanding

[REDACTED]

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**HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada**

4 December 1951

SUBJECT: Army Photographic Requirements, Operation Jangle

**TO: Mr. Carroll L. Tyler
Test Manager
United States Atomic Energy Commission
Nevada Test Site
P.O. Box 2088
Las Vegas, Nevada**

1. It is now planned that the present Camp Desert Rock troop complement will leave for their home stations about 15 December 1951. They will be replaced by a small winterization detachment.

2. A preliminary report of the Army participation in Operation Jangle will be completed about 15 December and forwarded to Headquarters, Sixth Army.

3. Since the photographic coverage of the effects of the 29 November shot of Operation Jangle will probably not be completely processed by the time our preliminary report is forwarded, it is requested that the photographs pertaining to that shot, when completed be sent from your office directly to the Commanding General, Sixth Army, Presidio of San Francisco, California, (ATTN: AG of S, G3).

**s/ B. W. Fitch
t/ B. W. FITCH
Brig Gen, USA
Commanding**

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

INTRODUCTION

1. Exercises Desert Rock II and III have been completed, and from them, valuable data have been obtained to complement and supplement that already made of record from Exercise Desert Rock I.

2. This report consists of a compilation of the major results of the two exercises. Some additional effects data which are presently unavailable will follow as soon as they can be furnished by the Atomic Energy Commission and Armed Forces Special Weapons Project when radiation effects have decreased to a sufficient level to permit final assessment.

3. The two exercises demonstrate the potent capability of these types of bursts for tactical operations if properly employed, and point the way to broader combat capabilities in the atomic weapons field.

4. It is believed that the results attained in these exercises are of the greatest importance to the Armed Forces and that timely and adequate planning should be made for increased participation.

/s/ B. H. Fitch

B. H. FITCH
Brigadier General, U.S.A.
Commanding

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PART IV - Comparison of Results of Desert Rock Exercises II and III, Conclusions and Recommendations

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PART I

General Plan for Exercises Desert Rock II and III

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4

PART I

General Plan for Exercises Desert Rock II and III

1. Introduction.

a. Exercises Desert Rock II and III were conducted in conjunction with AEC Operation JANGLE in order to obtain information relative to the effects of surface and underground nuclear explosions on typical army field emplacements, equipment and materiel, and to determine, insofar as possible, the probable effects on personnel. Although no animals were permitted in Desert Rock II and III, inferences were drawn as to effects on personnel from information obtained from Operation JANGLE animal experiments.

b. This report shows the damage which resulted to emplacements, equipment and materiel, and by indirect methods, the casualty effect on personnel.

c. It should be remembered when using this report that these nuclear explosions were of a very low yield (1 KT). The yield of the operational weapons for surface and underground explosions will be many times larger. Therefore, one should not consider the damage or casualties in terms of distance, but rather in terms of the weapon effects which were present at those distances.

d. Since the manner in which the various weapon effects will scale to larger yield weapons will not be completely known until the official report of the JANGLE Operation has been completed, it is not possible at this time to determine accurately the effects of the operational weapons. As soon as the scaling laws have been determined, appropriate portions of this report should be re-evaluated from that standpoint. At that time, firm estimates of the effectiveness of the operational weapons can be made. The Chief, AFSWP, has been requested to supply the scaling law information to Sixth Army as soon as it becomes available.

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e. It should be understood that this report is based upon preliminary results of Operation JANGLE and is subject to modification after the data have been more completely evaluated.

f. In order for this report to be published promptly, it was necessary to leave out certain information which was not available at the time it was written. These omissions are noted in the body of the report so that when the information becomes available it can be inserted in the appropriate place in the report. The Chief, AFSWP, has been requested to supply this information to Sixth Army as soon as it is available.

g. Appreciation is expressed to the Armed Forces Special Weapons Project for providing the AFSWP Advisory Group to assist in the test planning and to prepare this report. This group consisted of

Lt. Col. Rudolph K. Brunsvold - Infantry

Lt. Col. Gerald McDonnell - Medical Corps

Major Thomas A Gibson, Jr. - Chemical Corps

Appreciation is also expressed for the advice and assistance rendered by:

Dr. A. F. Spilhaus - Deputy Director for the
BUSTER/JANGLE Operation

Col. Max S. George - Director of Effects Tests Group

2. Mission.

The mission of Exercises Desert Rock II and III is outlined in letter, Headquarters Camp Desert Rock, to CG Sixth Army, dated 6 Nov 1951, Subject: Operation and Maintenance of Camp Desert Rock During and Subsequent to November, 1951, para 2b as follows:

"In coordination with AEC and AFSWP, participate in the remaining tests scheduled by AEC for November 1951, supplementing previous Army Tests conducted in Exercise Desert Rock I, to determine effects on Army fortifications, materiel, and equipment."

3. Test Objectives (Exercises Desert Rock II and III)

a. Effects Test Objectives.

(1) To determine nature and extent of damage sustained by standard (FM 8-15) military ~~installations~~ ~~when subjected to the effects of surface and underground nuclear explosions.~~

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(2) To determine nature and extent of damage sustained by military equipment and materiel when subject to the effects of surface and underground nuclear explosions. This determination will include an assessment of serviceability for immediate combat use of equipment and materiel tested.

(3) To determine the degree of protection afforded by standard field emplacements from nuclear radiation, and blast effects from surface and underground nuclear explosions.

(4) To determine by indirect methods, through the use of film badges and observation of damage to emplacements, the probable effects on personnel when exposed to the effects of surface and underground nuclear explosions.

b. Observer Indoctrination and Training Program.

In addition to the effects test conducted by the Commanding General, Camp Desert Rock, an indoctrination and training program for observers was conducted. This program consisted of instruction in the various aspects of atomic weapons. Discussion groups were formed and a report of the conclusions of each group was obtained.

4. Test Plan.

a. Test Area.

Desert Rock Exercises II and III were conducted in the Nevada Test Site in the area about 15 miles north of the Atomic Energy Commission's Control Point at Yucca Pass. The following sketch (Fig. 1) shows the general layout of the area.

b. Disposition of Equipment, Materiel and Emplacements.

(1) In conjunction with each of the test shots (surface and underground), materiel, equipment and emplacements were located in positions extending from 100 yards out to 1000 yards from the zero point. Film badges were placed throughout the test positions to obtain indirect information as to the effects of the radiation on personnel.

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ORIENTATION SKETCH OF TEST AREA
EXERCISES DESERT ROCK

GZ DR III

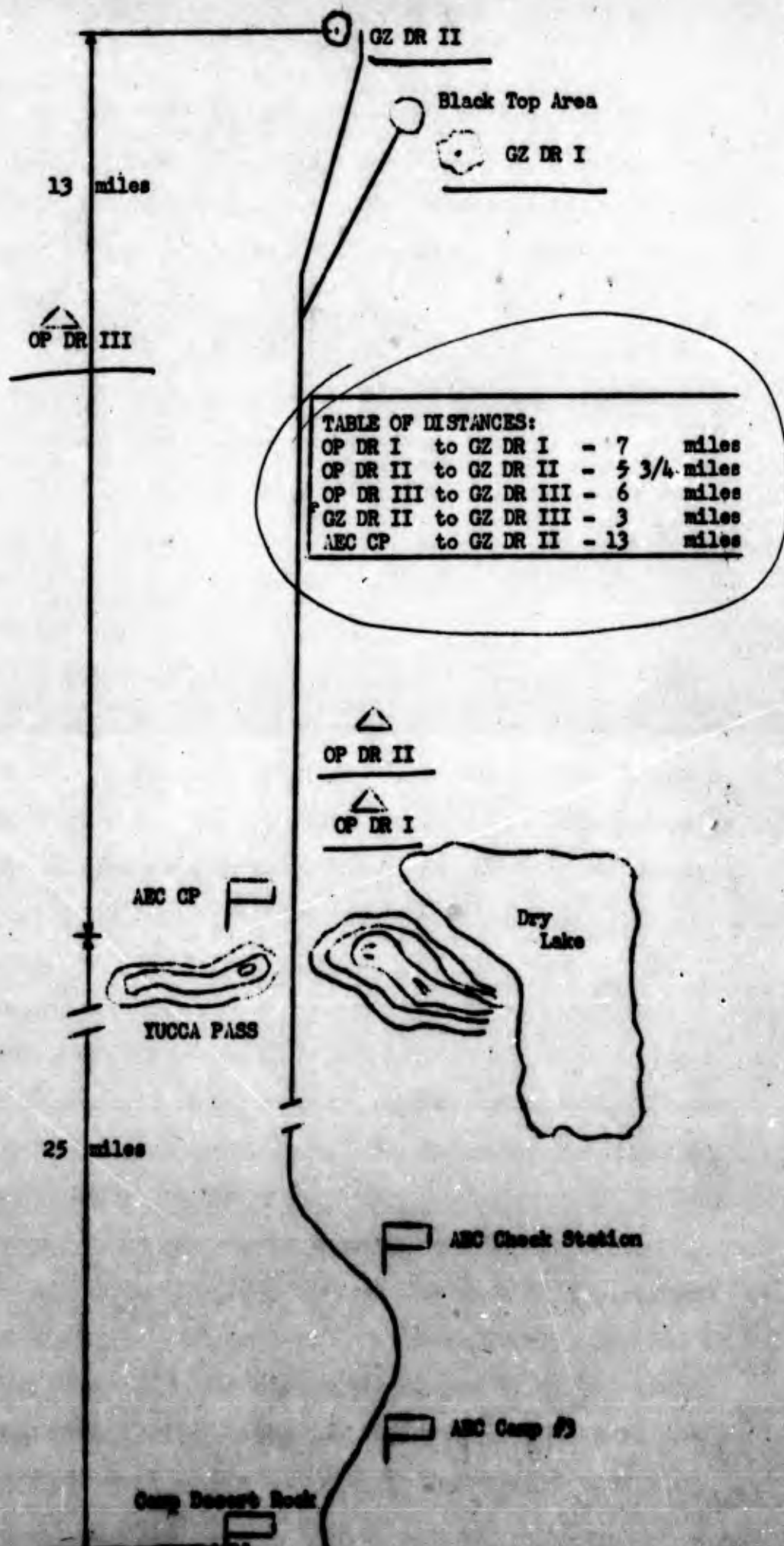


FIGURE 1

(NOT TO SCALE)

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c. Test Explosions.

The AEC Test Operation JANGLE, in conjunction with which the Desert Rock Exercises II and III were held, were as follows:

(1) Surface Shot (Exercise Desert Rock II)

A 1 KT nuclear explosion, detonated on the surface of the ground at 0900 hours on 19 November 1951.

(2) Underground Shot (Exercise Desert Rock III)

A 1 KT nuclear explosion, detonated at 17 feet below the surface of the ground at 1200 hours, 29 November 1951.

OFFICE OF THE DIRECTOR EFFECTS TESTS
c/o TECHNICAL OPERATIONS SQUADRON (PROV)
P.O. BOX 1349
Las Vegas, Nevada

24 November 1951

SUBJECT: Cooperation of Commanding General, Camp Desert Rock, and the Effects Tests Group of the Technical Operations Squadron (Prov) in Exercise Desert Rock II

TO: The Commanding General
Camp Desert Rock, Nevada

1. Reference is made to the meeting on this subject, held at Camp Desert Rock on 13 November 1951. At this meeting the Commanding General, Camp Desert Rock, requested that the responsibilities agreed to be made a matter of record. This letter outlines those agreements.

2. The Deputy Test Director, Dr. A.F. Spilhaus, and the Director of the Effects Tests, Colonel Max S. George, have examined the agreements set forth herein.

3. Responsibilities:

a. The Commanding General, Camp Desert Rock, assumes complete responsibility for Exercise Desert Rock II and the preparation of reports pertaining thereto.

b. The Commanding General, Camp Desert Rock will:

(1) Prepare emplacements.

(2) Emplace and remove test equipment.

(3) Provide officers of the technical service to record the damage and to determine post-shot operability of test equipment appropriate to their service.

(4) Provide the logistic and administrative support required to conduct the test.

(5) Restore test area to its original condition after test (fill in holes, remove debris, etc.)

(6) Submit copies of test plans and operational plans to Director Effects Tests (Colonel Max S. George) for coordination with the Military Effects Tests Program.

c. In order to assist the Commanding General, Camp Desert Rock, the Effects Tests Group has arranged for the services of qualified AFSWP officers to serve on a full-time basis as technical advisers and to prepare, under the direction of the CG, Camp Desert Rock, the preliminary technical report on Exercise Desert Rock II. These AFSWP Advisory Group officers are:

Lt. Col. R.K. Brunsvold, Inf.
Major Thomas Gibson, Oml. Corps.
Lt. Col. Gerald Mc Donnell, Med. Corps.

These officers may also assist in the on-site and test briefings for VIP's and observer personnel.

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24 November 1951

SUBJECT: Cooperation of Commanding General, Camp Desert Rock, and the Effects Tests Group of the Technical Operations Squadron (Prov) in Exercise Desert Rock II

d. Lt. Col. G.M. McHaney will be liaison officer in this headquarters between this office and the personnel listed above and will coordinate their activities with those of units subordinate to this office.

e. The Effects Tests Group will provide the AFSWP Advisory Group the preliminary basic effects data required by them in the preparation of the technical report. A request for the specific data required should be made to this office. Although no exact time can be given as to availability of these data, every effort will be made to supply the information at the earliest possible time.

f. The Director of the Effects Tests Group will review the report prepared by the AFSWP Advisory Group for technical accuracy and from the standpoint of security.

Max S. George
Colonel, Arty
Director

Distribution:

3 cys - CG, Camp Desert Rock
2 cys - ETG
2 cys - AFSWP Advisory Group

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EXERCISE DESERT ROCK II



1KT
Surface Shot
19 November 1951

Part II

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PART II

Exercise Desert Rock II

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PART II

Exercise Desert Rock II

Section A - Effects Test Report.

1. Test Plan - General Summary.

a. In this test, typical and special Army field emplacements, materiel and equipment were positioned from 100 yards out to 1000 yards from surface zero. The layout consisted of six test positions located at 100, 200, 400, 630, 800 and 1000 yards from zero point. Inter-
- spersed between the test positions were two lines of two-man foxholes, revetted and unrevetted, end-on and side-on to the zero point. The detailed layout and contents of each test position are shown in the following diagram (Fig. 2).

b. The preparation of emplacements, placement of equipment, materiel and film badges, pre-shot and post-shot photography, damage evaluation and restoration of the area were carried out as described in Tabs II-A, II-B and II-C.

2. Test Results - General Summary.

a. General - (See Tab II-D)

(1) The surface shot of the 1 KT yield test weapon was fired at 0900 hours on 19 November 1951. The wind was from a southeasterly direction which carried the majority of the residual contamination away from the Desert Rock II test positions and permitted early entry into the positions for evaluation purposes.

b. Effects on Materiel (See Tab II-E)

(1) In this test the damage to the major items of materiel extended out to Position 2, which was 200 yards from zero point. The materiel in general was located above ground. The weapons were in firing position in the emplacements. Some smaller articles of equipment were in emplacements below ground and were damaged or lost due to the collapse of the emplacements. It is believed that the majority of damage to materiel was caused by the air blast. There was little evidence of thermal radiation ~~burning subject~~ for the 1/4-ton jeep at 100

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Psn # 5

A

OBSERVATION POST

- 2 Compass, Lentic (one on surface - one under cover)
- 2 Cases canned rations (one on surface - one under cover)
- 4 Cans, water 5 gal (one can closed - one open on surface, one can closed and open under cover)
- Assorted perishables & salt

B

MG EMPL

(Horseshoe Type)

- 2 MG Cal 30
- 2 Mounts, MG Cal 30 (one each on surface - one each under cover)

C

81 MM MORT EMPL

- 1-EEB Telephone
- 2-Radio SCR-536 (one on surface - one under cover)

D

TWO MAN FOX HOLE w/c

- 2-Dummies in fatigues, helmet w/rifle Cal. 30 M-1 (one in hole - one on surface)
- Mask, gas, service
- Shelter Tent adjacent to Empl D

E

57 & 75 MM RR EMPL

- 57 MM RR Mounted

F

SPL MG EMPL

- 1-EEB Telephone
- 4-Coils No 114 (2 above - 2 under)
- Various wire circuits between C & F (one each above & one buried 8' under)

Psn # 4

A

OBSERVATION POST

- 2-Compass, Lentic (one on surface - one under cover)
- 2-Cases canned rations (one on surface - one under cover)
- 4-Cans, water 5 gal (one can closed - one open on surface, one can closed and open under cover)
- Assorted perishables & salt

B

MG EMPL

(Horseshoe Type)

- 2 MG Cal 30
- 2 Mounts, MG Cal 30 (one each on surface - one each under cover)

C

81 MM MORT EMPL

- 1-EEB Telephone
- 2-Radio SCR 300 (one on surface - one under cover)
- Double apron fence behind Empl F

D

TWO MAN FOX HOLE w/c

- 2-Dummies in fatigues, helmet w/rifle (one in hole - one on surface)
- Mask, gas, service
- Shelter Tent adjacent to Empl D

E

57 & 75 MM RR EMPL

- 75 MM RR Mounted

F

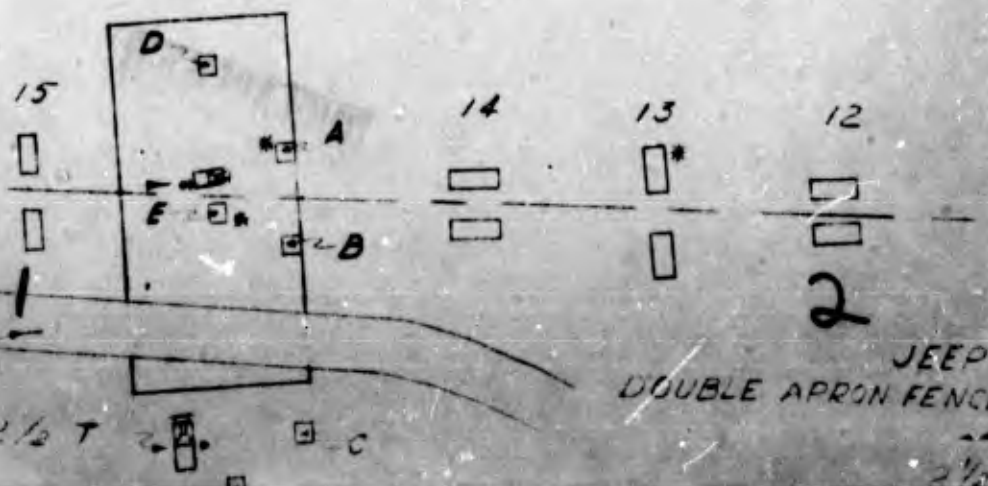
SPL MG EMPL

- 1-EEB Telephone
- 4-Coils No 114 (2 above - 2 under)
- Various wire circuits between C & F (one each above & one buried 8' under)

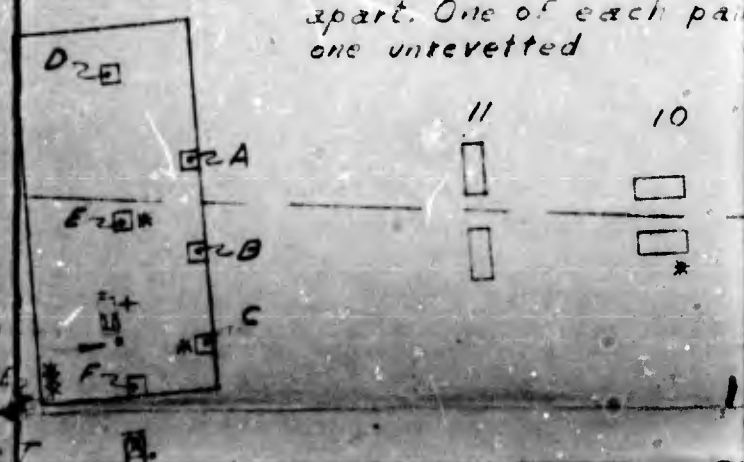
NOTE

Two man fox holes in pairs 10' apart. One of each pair one unvetted

Psn # 5



Psn # 4



P 1 #3

Psn #2

OBSERVATION POST

- 2-Compass Lensatic (one on surface one under cover)
- 2-Cases canned rations (one on surface one under cover)
- 4-Cans water 5 gal (one can closed - one open on surface, one can closed - one open under cover)
- Assorted perishables & salt

B

MG EMPL

(Horseshoe Type)

- 2-MG Cal 30
- 2-Mounts, MG Cal 30 (one each on surface - one each under cover)

C

81 MM MORT EMPL

- 1-EEB Telephone
- 2-Radio SCR-536 (one on surface - one under cover)

D

TWO MAN FOX HOLE w/c

- 2-Dummies in fatigues, helmet w/rifle Cal. 30 M-1 (one in hole - one on surface)
- Mask, gas, service
- Shelter Tent adjacent to Empl D

E

57 & 75 MM RR EMPL

- 57 MM RR Mounted
- 1-Sniperscope (one surface)

F

SPL MG EMPL

- 1-EEB Telephone
- 4-Coils No 114 (2 above - 2 under)
- Various wire circuits between C & F (one each above & one buried 8" under)

A

OBSERVATION

- 2-Compass, Lensatic
- 2-Cases, canned rations
- 4-Cans water 5-gal on surface, one
- Assorted perishables

B

MG EMPL

(Horseshoe Type)

- 2-MG Cal 30
- 2-Mounts MG Cal 30 (one each on surface)

C

81 MM MORT

- 1-EEB Telephone
- Double apron fence

D

TWO MAN FOX

- 2-Dummies in fatigues, helmet w/rifle Cal. 30 (one in hole - one on surface)
- Mask, gas, service
- Shelter Tent adjacent to Empl D

E

57 & 75 MM

- 75 MM RR Mounted
- 1-Sniperscope (one surface)

F

SPL MG EMPL

- 1-EEB Telephone
- 4-Coils No 114 (2 above - 2 under)
- Various wire circuits between C & F (one each above & one buried 8" under)

one under cover)
one under cover)
one open on surface,
one open under cover)

under cover)

one under cover)

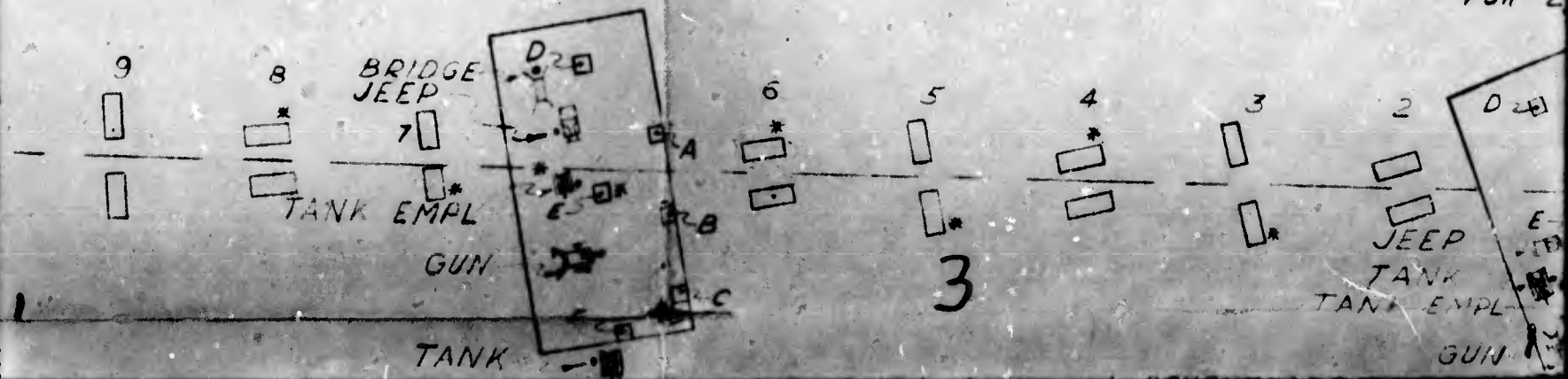
Cal 30 M-1

under)

E
pairs spaced 100'
air is revetted-

Psn #3

Psn #2



SECTION POST

Lensatic (one on surface - one under cover)
 Canned rations (one on surface - one under cover)
 5 gal. (one can closed - one open on surface - one can closed - one open under cover)
 Assorted perishes & salt

EMPL
 Type)

Cal. 30
 on surface - one each under cover

MORT EMPL

phone
 fence behind Empl F

AN FOX HOLE w/c
 in fatigues, helmet w/rifle
 in hole - one on surface)
 service
 adjacent to Empl D

MM RR EMPL
 mounted
 on surface)

EMPL
 phone
 14 (2 above - 2 under)
 circuits between C & F
 above & one buried & under)

PSN 1

B

MG EMPL

(Horseshoe Type)
 1-MG Cal. 30 M1917A1 (on surface)
 1-MG Cal. 30 M1917A4 (under cover)
 2-Mounts, MG Cal 30

C

81 MM MORT EMPL

1-EEB Telephone
 2 Compass, Lensatic (one on surface - one under cover)
 2 Cases, canned rations (one on surface - one under cover)
 1 Cans, water 5 gal. (one can closed - one open on surface - one can closed - one open under cover)
 Assorted perishables and salt

E

57 & 75 MM RR EMPL
 57 MM RR Mounted

F

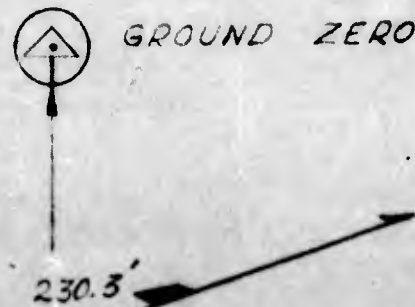
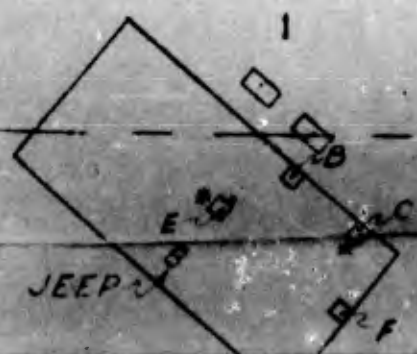
SPL MG EMPL

2 Dummies in fatigues, helmet
 w/ Rifle Cal 30 M1 (one in hole - one on surface)
 Mast, gas service
 1-EEB Telephone
 4 Cans No 114 (2 above - 2 under)
 Shelter Tent adjacent to Empl F
 Various wire circuits between C & F

PSN #2



PSN #1



5.20°N

4

57 MM RR EMPL
75 MM RR Mounted

F

SPL MG EMPL
1-EEB Telephone
4-Coils No 114 (2 above - 2 under)
Various wire circuits between C & F
(one each above & one buried 8' under)

57 MM RR Mounted
1-Sniperscope (one surface)

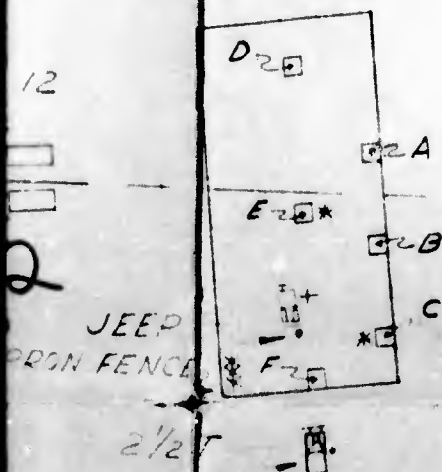
F

SPL MG EMPL
1-EEB Telephone
4-Coils No 114 (2 above - 2 under)
Various wire circuits between C & F
(one each above & one buried 8' under)

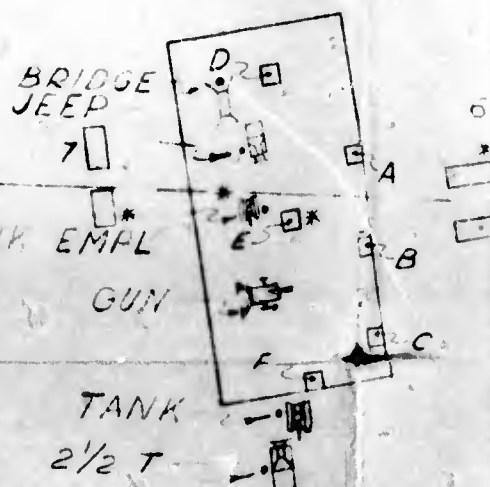
NOTE

Two man fox holes in pairs spaced 100' apart. One of each pair is revetted - one unrevetted

Psn #4

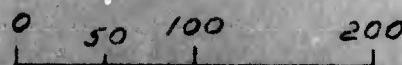


Psn #3



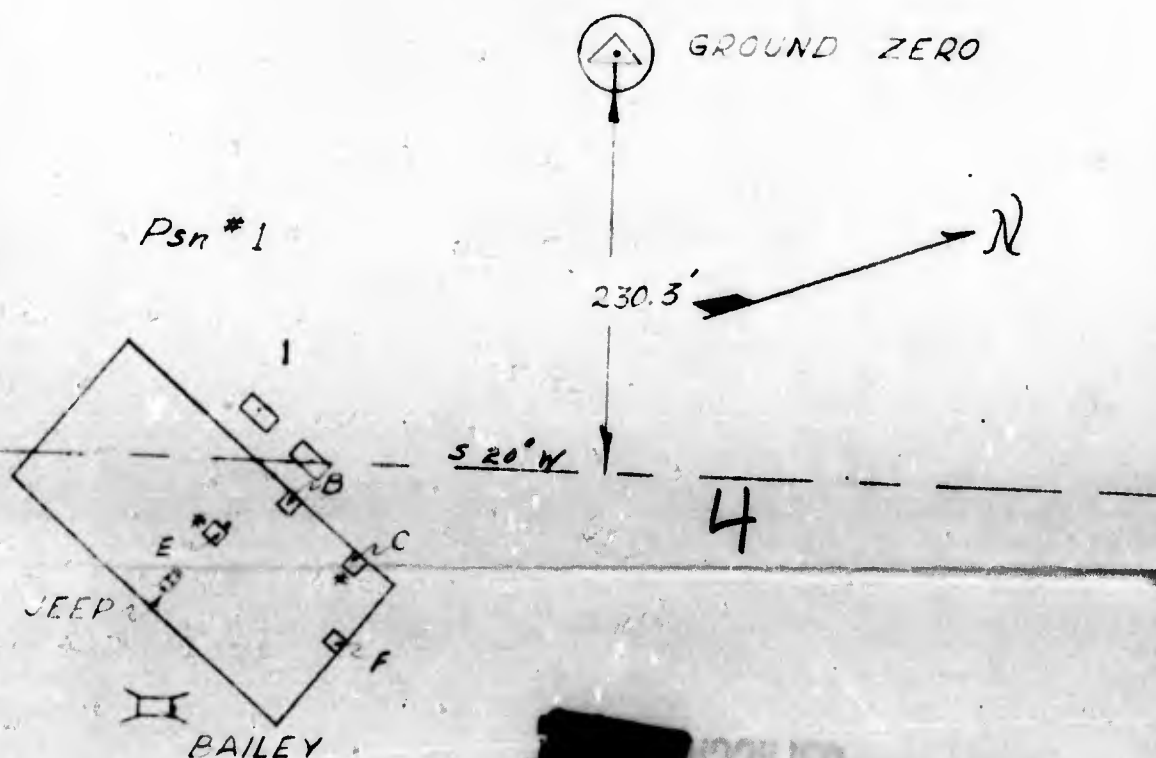
* = INDICATES 1 PAIR THERMAL INDICATORS
ONE EXPOSED - ONE COVERED
+ = INDICATES ONE THERMAL INDICATOR ONLY
PLACED ON SEAT IN JEEP AT PSN #4

SCALE 1"=100



surface)

above - 2 under)
between C & F
one buried 8 under)



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LAYOUT OF TEST POSITIONS
EXERCISE DESERT ROCK II
NOVEMBER 1951

S-3 Section Camp Desert Rock, Nevada

Surveyed by:
231st ENGR C BN

Drawn by:

W. S.

Date:
16 NOV 51

Official:

SMITH S-3
Maj Arty

FITCH
Brig Gen

6

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yards which burned after its gasoline ignited. Typical examples of damage at Position 2 (200 yards) are:

*Complete
w/it 1/2
(6 300 yds)
(6 500 yds)*

M-24 Tank.....	Moved sideways one foot. Track binds and would not turn. <u>Unserviceable.</u>
HMG Cal .30.....	Cooling system destroyed, plugs out. <u>Unserviceable.</u>
105 mm Howitzer.....	Sights, shield and trail damaged. <u>Unserviceable.</u>
1/4-ton Truck.....	Frame twisted, severe damage. <u>Unserviceable.</u>
Double Apron Fence.....	Wire ripped from posts. Post bent 60°.
Signal Equipment.....	<u>Unserviceable.</u>

With the exception of moderate damage to the 2½-ton truck at Position 3 (400 yards) there was little ^(light) damage to the major items beyond Test Position 2.

c. Effects on Emplacements (See Tab II-F)

(1) In this test the revetted emplacements withstood the effects of the weapon markedly well. The most distant revetted emplacement which collapsed to an appreciable degree was foxhole No. 3 at 280 yards. The most distant unrevetted foxhole which suffered serious damage was foxhole No. 9 at 515 yards.

d. Photos showing Typical Damage at the Various Positions.

For comprehensive photo-coverage of damage see Tab II-G.

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Position 1 (100 Yards)



Bailey Bridge Before ↗ After ↘
Moved Sideways 5 Yards



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Position 1 (100 Yards)



1/4 Ton Truck - Before ↑ After
Moved 12 Yards to the rear ↓



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Position 1 (100 Yards)



57 mm Recoilless Rifle - Before ↑ After
Gun Blown 35 Yards Note: Burns ↓
on sand bags



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Position 2 (200 Yards)



Tank - Before ↑ Looking Away From Zero Point After
Looking toward Zero Point. Note: Tank ↓
fender in fore ground. Tank unserviceable
due to broken lugs on tracks.



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Position 2 (200 Yards)



HIG in Emplacement - Before ↑ After ↓



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Position 3 (400 Yards)



Before ↑
Bailey Bridge. Note: Loose
ramp and broken walkway
After ↓



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Position 3 (400 Yards)



Before ↑
2 1/2 Ton Truck. Truck was Operative
After ↓



70

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24

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Position 4 (633 Yards)



75 mm Recoiless Rifle - Before ↑ After ↓



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e. Film Badge Results (See Tab II-H)

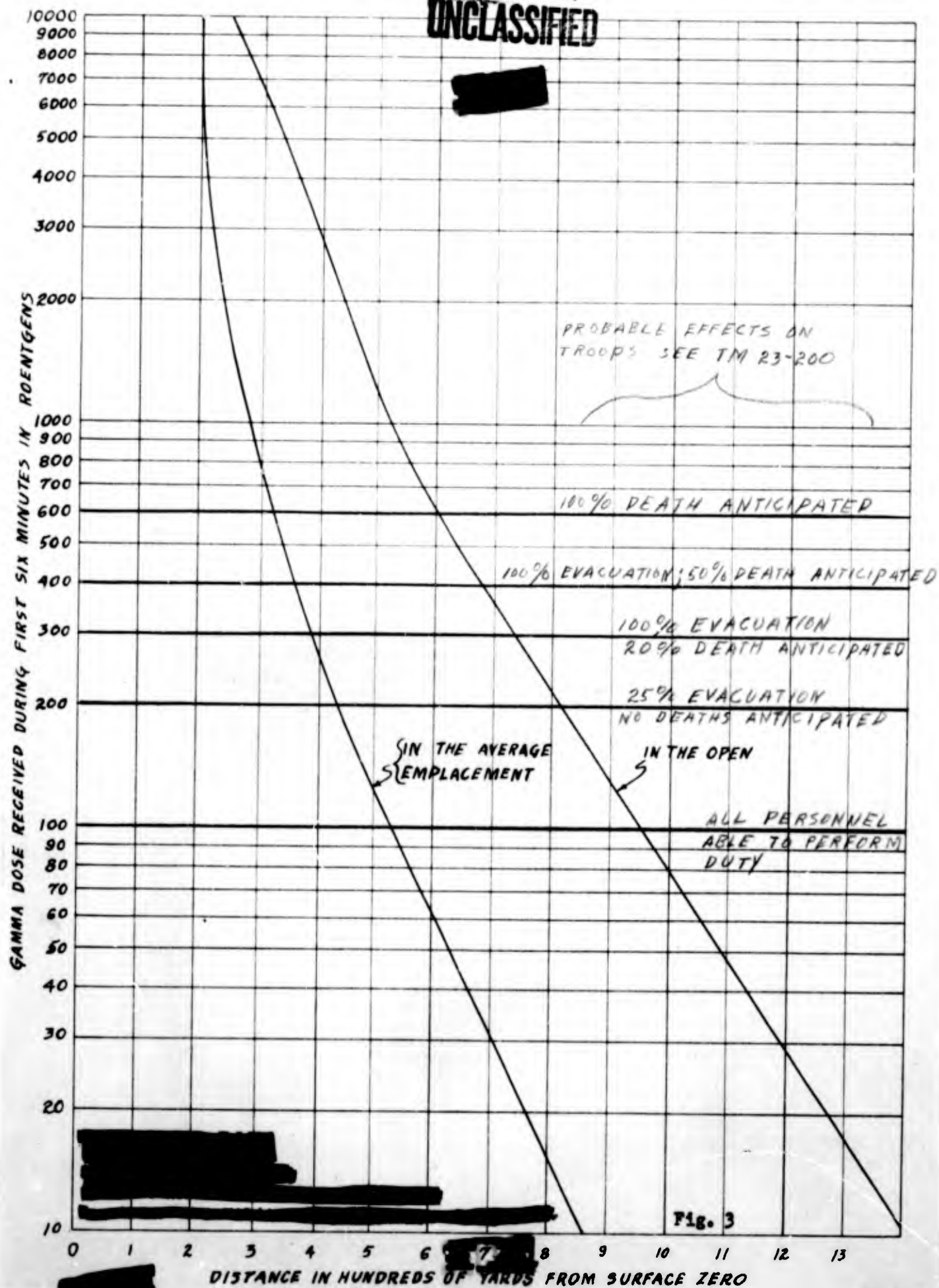
(1) Most of the film badges for measuring gamma radiation dosage were recovered and the results obtained therefrom were generally satisfactory. The dosage measured on the film came from two sources: one, from the initial gamma radiation from the fireball and the radioactive column of the cloud; and two, from the residual radioactive contamination deposited on the ground. The gamma radiation from the fireball and column had left Desert Rock II positions in approximately six minutes. The total dosage measured during the first six minutes after the explosion along the line of Desert Rock positions is shown graphically in Figure 3.

(2) The dosage in the open is seen to be more than the dosage in the average emplacement. The average emplacement reduced the dosage to 10% of the dosage in the open at the same distance. Indications were that overhead cover increased the protection from gamma radiation to a small degree. The orientation of the two-man foxholes with respect to the zero point had an effect on the protection afforded. The foxholes oriented side-on toward zero point gave somewhat more protection.

(3) Information concerning the residual radiation dose rate was obtained from the Effects Tests Group of Operation JANGLE. Desert Rock positions were up-wind from zero point and were only slightly contaminated. One and one-tenth (1.1) square miles of area were contaminated to a level of 100 r/hr or greater at H + 1 hour. See Figure 4 for this information.

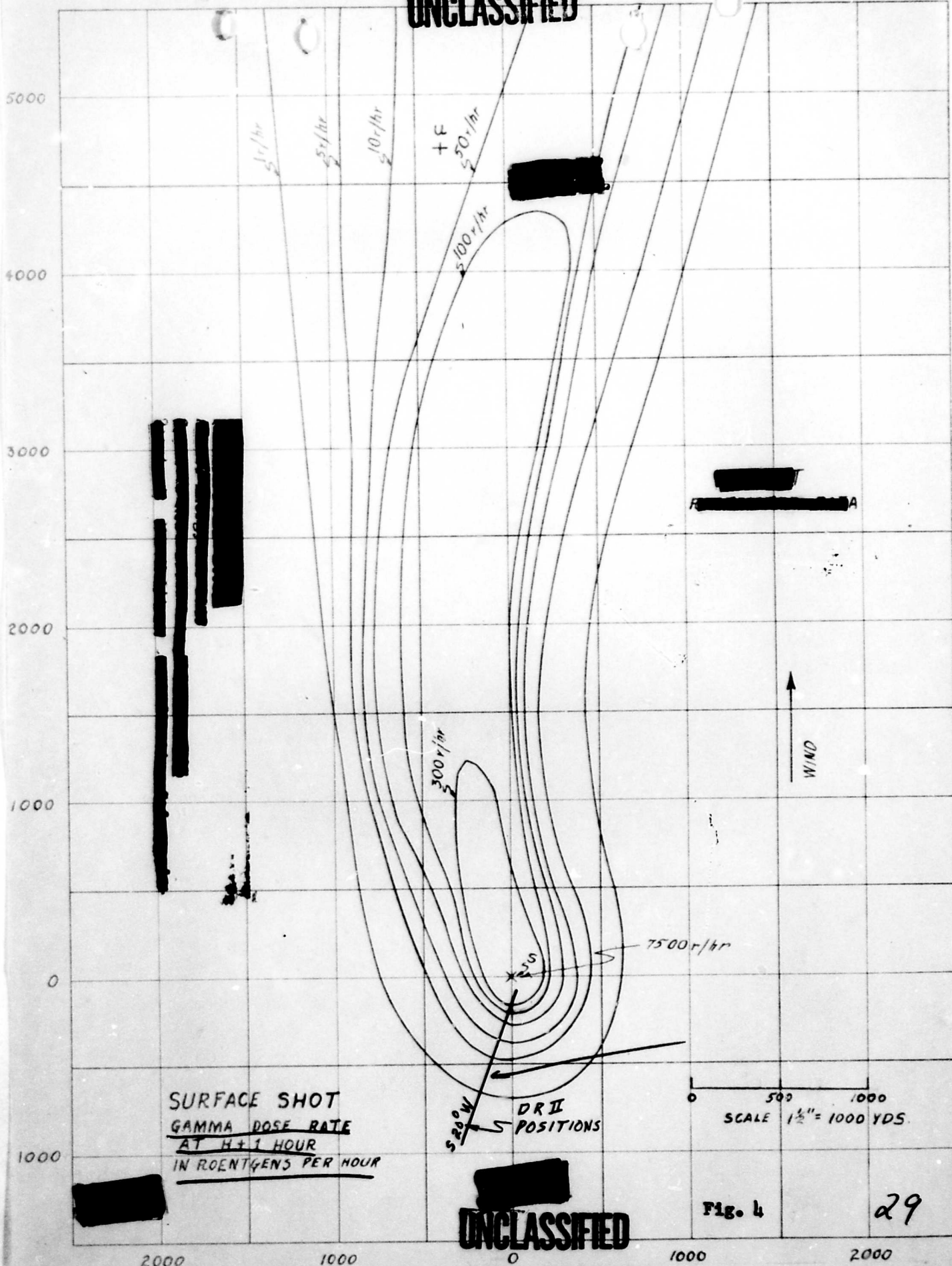
(4) The total dose of gamma radiation over the entire area during the time H to H + 2 days was obtained from the Effects Tests Group of Operation JANGLE. See Figure 5 for this information. The area covered by a total dose in two days of 400 r or greater is 0.7 square miles. It should be noted that more than 90% of the total dose in this 0.7 square mile area is received during the first few minutes following the explosion.

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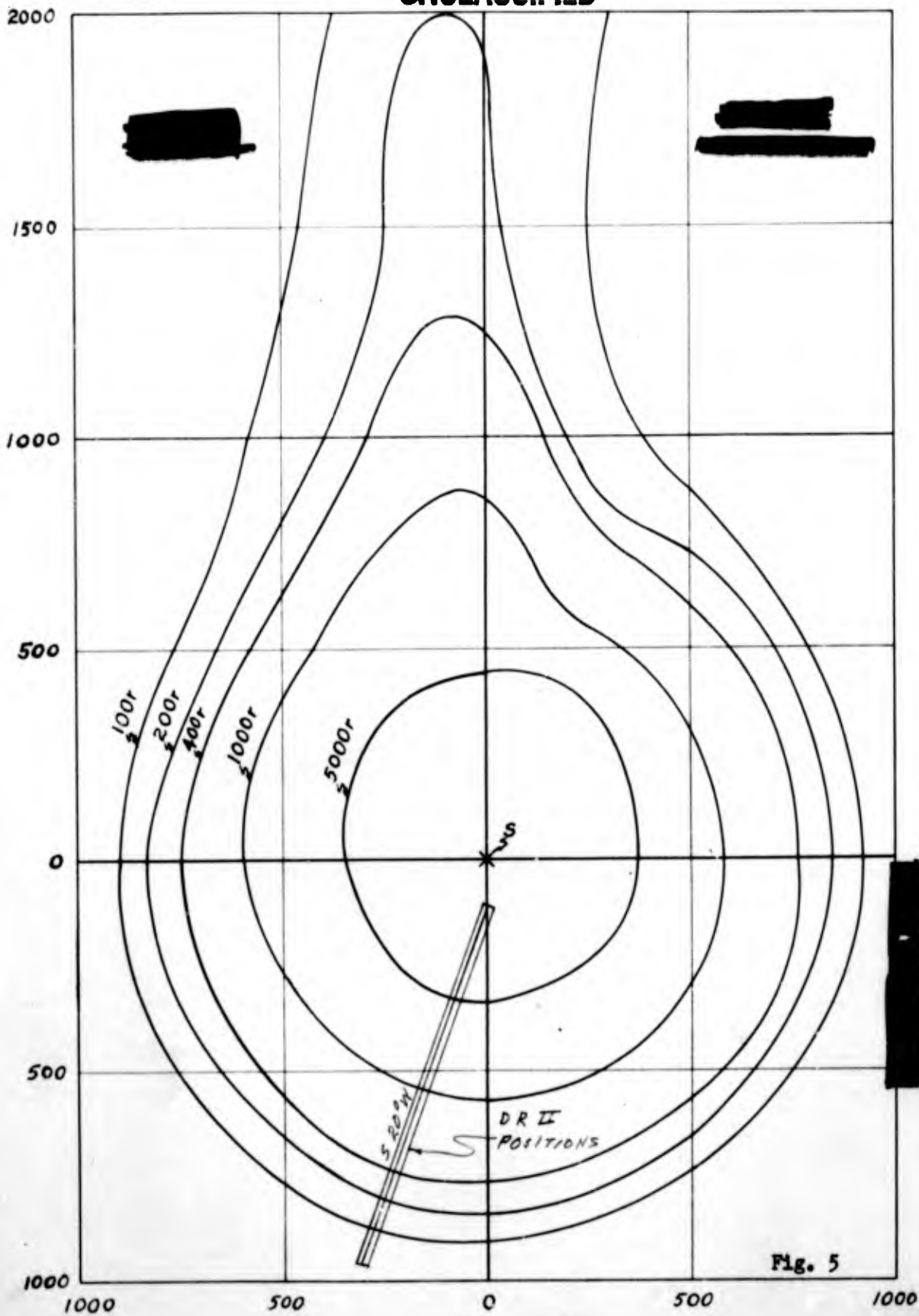


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SCALE IN YARDS
TOTAL DOSE IN ROENTGENS DURING FIRST TWO DAYS; SURFACE BURST

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f. Effects on Food and Water (See Tab II-I).

(1) The majority of the boxes of "C" rations, cans of water, pieces of beef, and sacks of salt exposed were recovered. Fission product contaminated dust did not enter the "C" rations, the closed water cans, the beef wrapped in paper, or the salt in paper sacks. Water in open water cans and bare beef were contaminated with fission products. An attempt was made to decontaminate the meat from 100 yards by cutting away the outside layers. Most of the contamination could be removed, but some remained down to a depth of 3/4 of an inch. Because the meat had weathered in the field for five days before recovery, it was dry and difficult to work with, and the experimental results were inconclusive.

(2) Neutron induced radioactivity was observed in the "C" ration box exposed above ground at 200 yards and in the salt exposed above ground at 200 yards and 400 yards. Five days after the shot, this induced activity had decayed to a point where the material was edible.

g. Effects of Radioactive Dust (See Tab II-J)

(1) A respiratory radioactive dust hazard did not exist following the surface shot. This was due to the fact that the particles which fell out in the immediate area were of such size that they would not be breathed in by the respiratory system. The smaller particles were carried away by the atomic cloud and dispersed to such a degree that no hazard resulted.

h. Effects on Animals (See Tab II-K)

(1) Although no animals were exposed as a part of Exercise Desert Rock II, the results of the animal (sheep and dogs) exposure test of the Effects Tests Group of Operation JANGLE were made available for this report. These results are:

<u>Animals Location from Surface Zero</u>	<u>Radiation Dosage Received</u>	<u>Deaths</u>
2670 yards	Less than 10 r	None
1670 yards	Less than 10 r	None
830 yards	100 to 300 r	None

All animals exposed in the surface shot survived.

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1. Correlation of Damage with Caustive Factors.

(1) The following diagram (Fig. 6) illustrates the limits of damage of the various types as a function of distance and relates it to the weapon effects which were present at those distance. The information on ground acceleration and horizontal and vertical ground displacement was not available at this writing and could not be included. That section of the figure is left blank so that this information can conveniently be added when it is available.

3. Conclusions.

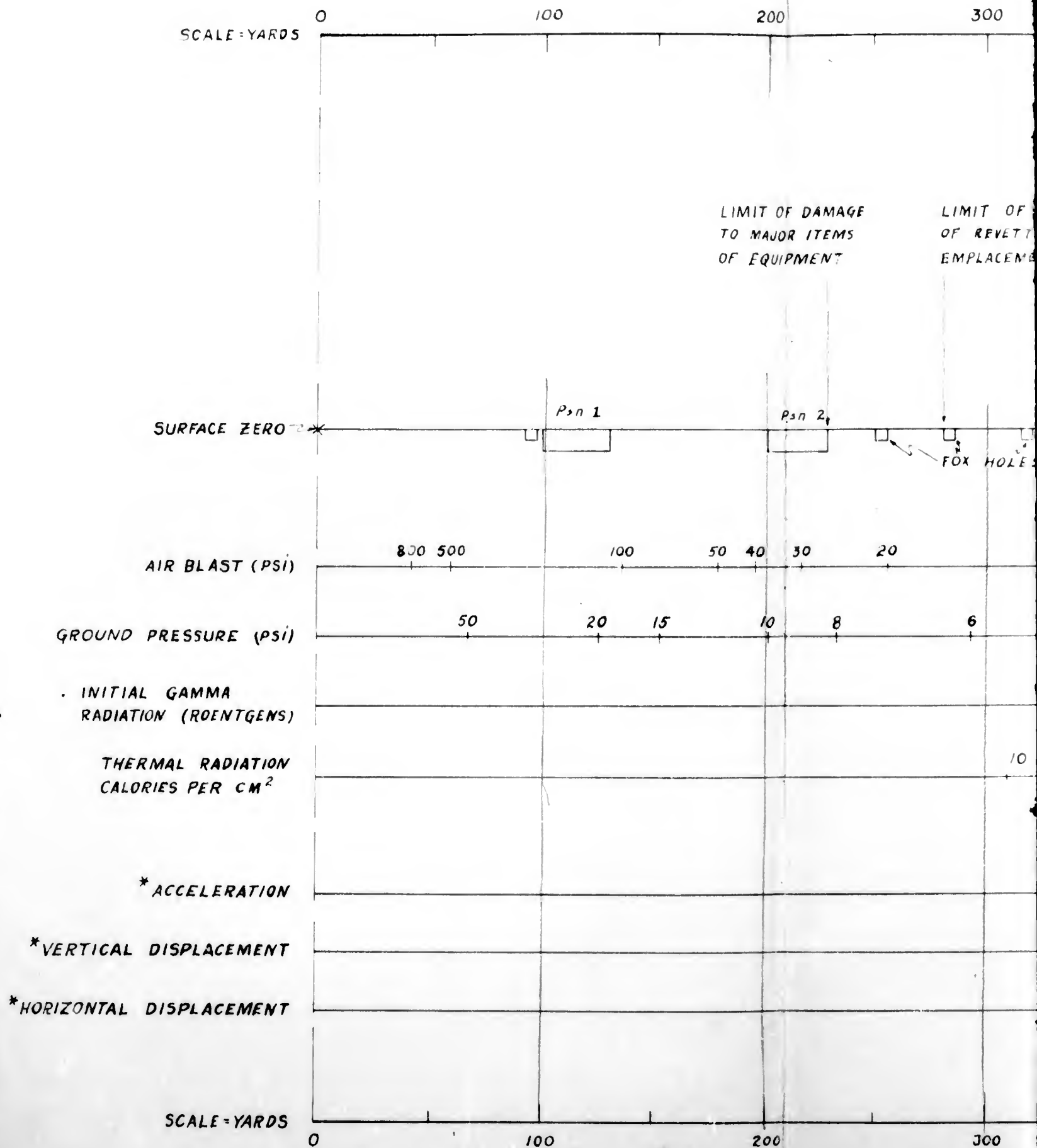
a. The major damage to personnel, materiel and equipment from a surface burst results from the air blast, initial gamma radiation and thermal effects in much the same fashion as from an air burst weapon. The principal differences were the greater ground shock effects and residual contamination from the surface burst weapon.

b. The residual contamination on the ground from a surface burst is sufficient to preclude occupancy of a relatively large area for a period of days after the shot. In this test, an area of roughly 1.8 square miles was contaminated to a level that would have prevented continuous occupancy even under combat conditions for at least two days.

c. From a surface explosion, the effects of contamination of equipment are not militarily significant beyond the range of severe damage from other causes. The contaminated dust can be removed by simple decontamination methods. The induced radioactivity in the metal is so low as to be negligible.

d. Typical field emplacements provide approximately 90% protection against the initial nuclear radiation. Overhead cover on emplacements increased the protection slightly, but not sufficient to warrant construction of overhead cover for this purpose alone. It should be remembered that in regions of high radiation dosage the blast pressures are also very high and would probably cause collapse of the overhead cover and the emplacement.

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* NOTE: THIS INFORMATION NOT AVAILABLE AT THIS TIME.

S SHOT

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CORRELATION OF DAMAGE WITH CAUSATIVE FACTORS

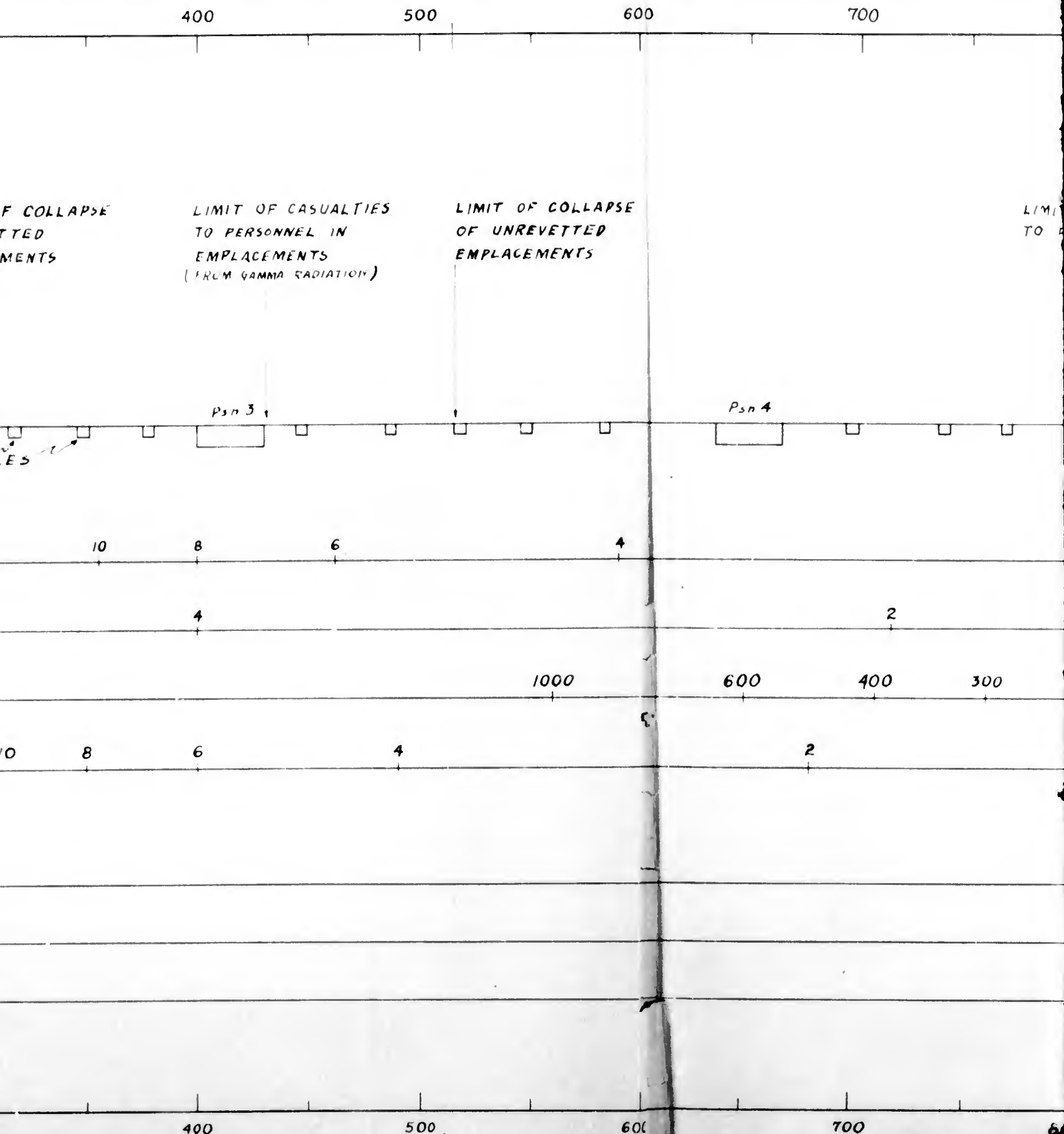


FIGURE 6

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FACTORS

700 800 900 1000 1100

LIMIT OF CASUALTIES
TO PERSONNEL IN THE
OPEN

PsN 5

PsN 6

2

2

400

300

200

100

50

700

900

1000

1100

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14 DEC '51

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e. Typical field emplacements provide about 75% protection from the residual radiation (contaminated dust on the ground and in the emplacement.)

f. The special machine gun emplacements did not appear to exhibit any particular advantage over the standard emplacements.

g. Canned rations and water in the vicinity of a surface explosion are usable provided the containers are still intact.

h. The measured values of thermal radiation, initial gamma radiation and air blast are in very close agreement with those predicted from TM 23-200 "Capabilities of Atomic Weapons".

i. The radioactive dust from the surface burst did not constitute a respiratory hazard due to its large particle size.

Section B - Operational Report.

1. General Summary. In order to support the effects test and accomplish the assigned missions of Camp Desert Rock, certain camp operational matters were accomplished. This portion of the report deals with those matters of general interest only. Troop support for Camp Desert Rock was drawn from the entire Sixth Army Area. Participating units are listed in Tab II-L "Troop List".

2. An Observer Indoctrination and Training Program designed to bring official observers up-to-date on atomic weapons and development was undertaken. Subjects to be covered were closely coordinated with AFSWP and Sandia Base, Albuquerque, New Mexico. Schedule, of course, is listed on Tab II-M. Two full-time instructors were secured from AFSWP. Other instructors were drawn from AFSWP Effects Tests Group, Nevada Test Site, and Technical Services, Camp Desert Rock. On completion of the training course, the observers were invited to give their comments on the implications of atomic weapon on employment of arms and troops in future combat operations. The group reactions are detailed in Tab II-N. The general class opinion was:

a. That no changes in design of present equipment are required to cope with an atomic attack.

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b. There is no need for specialized equipment in the forward areas.

c. There are no new problems in disposition, handling and transportation of equipment and material in forward areas, and

d. No special training is necessary for troops except the CBR monitor in each Company, Battery or similar size unit. The possibility of atomic attacks does not warrant changing our present doctrine of disposition of troops in the attack or defense. It was generally agreed that training of all troops should include a short course on nature of atomic weapons, their effect, and precautions necessary for individual safety.

3. Miscellaneous operational matters of general interest include

a. A radiological safety plan which essentially provided rad-monitors, with radiac detection equipment, to accompany all personnel entering the shot area. Film badges to be issued individuals who might be exposed to radiation. These badges, when developed, disclosed the amount of radiation received by the individual. Radiation tolerance limits, established by AEC, was set at a total dosage of 3 roentgens. This tolerance was extremely safe and is not to be construed as a military operational dosage. Details of RadSafe plan are listed in Tab II-O.

b. Since all personnel working in the shot area were exposed to radioactive contamination, a decontamination plan was necessary. Decontamination was accomplished by dry brushing, dusting with wet rags and washing. These methods were used on personnel and test items with excellent success. Details of this plan are attached on Tab II-P.

c. Radiological safety measures were adequate as witnessed by the fact that no individual received a hazardous dosage of radiation. Personnel, test materiel and equipment decontamination was effective. All items were reduced to below the maximum limit of a milli-roentgen per hour level. A more detailed report is attached as Tab II-Q.

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d. The high percentage of classified subject matter inherent in the nature of the operation necessitated positive counter-intelligence measures. Details of this plan are listed as Tab II-R.

e. The terrain study (Tab II-S) was prepared and disseminated for orientation purposes.

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Hqs, Camp Desert Rock
Las Vegas, Nevada
11 November 1951

EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK II

SECTION I - GENERAL PLAN OF TEST—"S" SHOT.

1. Summary

a. On D-day the CG, Camp Desert Rock will conduct a test of military equipment, materiel and emplacements by exposing them to the effects of atomic bombs at the ALC Nevada Test Site. From the test an evaluation of damage to equipment, materiel and emplacements will be made.

b. The general test variables to be imposed are:

(1) Equipment will be placed both on the ground surface and below ground surface.

(2) Normal types of tactical field fortifications will be constructed plus special fortifications designed for the loads and hazards expected.

(3) The items in para 1b (1) & (2) will be placed at various distance from ground zero.

c. Assessment of damage will be made subsequent to the explosion and a report of results compiled.

2. Basic Directives

Letter, Headquarters Camp Desert Rock, to CG Sixth Army, dated 6 Nov 1951.
Subject: Operation and Maintenance of Camp Desert Rock During and Subsequent to November, 1951, para 2b as follows:

"In coordination with AEC and AFSWP, participate in the remaining tests scheduled by AEC for November 1951, supplementing previous Army Tests conducted in Exercise Desert Rock, to determine effects on Army fortifications, materiel, and equipment."

3. Detailed Test Objectives

a. Test objectives are:

(1) To determine nature and extent of damage sustained by standard (FM 5-15) military emplacements when subjected to the effects of a nuclear surface explosion.

(2) To determine nature and extent of damage sustained by military equipment and materiel when subjected to the effects of a nuclear surface explosion. This determination will include an assessment of serviceability for immediate combat use of equipment and materiel tested.

(3) To determine the degree of protection afforded by standard field emplacements from nuclear radiation, and the blast effects from a surface nuclear explosion.

(4) To determine by indirect methods, through the use of film badges and observation of damage to emplacements, the probable effects on personnel when exposed to the effects of a surface nuclear explosion.

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4. Means of Reaching Test Objectives

a. Field fortifications

(1) For test "S" a line of revetted and unrevetted foxholes commencing 700 feet from G.Z. and running out 3000 feet at 100-foot intervals will be constructed. See Annex 1

(2) For test "S" six test positions will be constructed one each at 300 feet, 600 feet, 1200 feet, 1900 feet, 2400 feet, and 3000 feet from G.Z. See Annex 1

(3) After construction, sketches will be made and photographs will be taken of all emplacements prior to the test explosion.

(4) Post-shot evaluation of damage will be made and recorded by technical personnel.

b. Military Equipment and Materiel

(1) Six test positions (1-6) will contain equipment to be exposed in various attitudes and with varying amounts of protection. Location of these test positions is shown on attached sketch (Annex 1), with G.Z. as shown.

(2) Location of equipment and materiel within these positions, as recommended by appropriate technical services, is shown by emplacement and position charts (Annex 1).

(3) Details of time of placement, pre-shot testing of equipment serviceability, identification and location marking, and removal instructions are contained in Section II of this plan.

(4) Post-shot evaluation and description of effects will be made by a supporting evaluation group from the Armed Forces Special Weapons Project (AFSWP) and Camp Desert Rock technical service representatives. Details are contained in Section II.

(5) Equipment and materiel will be removed from test positions on order, and in accordance with detailed plan outlined in Section II.

c. Protection Afforded by Emplacements

(1) Film badges will be installed in emplacements to indicate the amount of nuclear radiation received.

(2) Observation of the damage to emplacements will be made to determine, indirectly, the probable effects on personnel, materiel and equipment located in the emplacements.

d. Special Emplacement

(1) One special machine gun emplacement at position 1-6 will be prepared to determine its advantage over standard emplacements.

(2) Film badges will be placed in this special position to indicate the actual protection afforded.

e. Support for Other Aspects of Operation Desert Rock II

(1) One of the missions of Operation Desert Rock II is to furnish observers soon after the explosion, with an explanation of general effects of the explosion on the test positions. To furnish data for this purpose, post-shot damage assessment will be made by Effects Evaluation Teams, and furnished to designated AFSWP representatives who will conduct the briefing.

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EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK II

f. Reports

(1) The data obtained from the Desert Rock II test position, supplemented by information furnished by the Effects Tests Group of Operation JANGLE will be consolidated into a single report, to be prepared by the AFSWP Advisory Group under the direction of the Commanding General, Camp Desert Rock.

SECTION II - DETAILED IMPLEMENTATION OF PLAN

5. Organization and Functions of Personnel

a. Administrative relationships and groupings are shown in Annex 2.

b. Major functions and responsibilities of the various elements concerned with this plan are:

(1) Camp Desert Rock Chiefs of Technical Services ✓

(a) Obtain the equipment and materiel prescribed by the CG Camp Desert Rock for the Test (Annex 3), and provide for its movement and placement into the test positions on D-1, completing such movement by 1630 hrs D-1 (Annex 6).

(b) Provide personnel for damage assessment to such equipment and materiel at the test positions.

(c) Insure that the equipment and materiel is moved back from the test site to Camp Desert Rock on order, or is disposed of in place if movement is impossible for radiological or other reasons. Undamaged or repairable items of equipment and materiel will be picked up and accounted for on the stock record accounts of the Service concerned.

(d) Prepare a draft report concerning the post-shot condition of equipment and materiel which falls within their respective supply field, and turn such report over to the O.I.C. Effects Test for correlation with other data and compilation into one comprehensive report on the effects test.

(2) AFSWP Advisory Group ✓

(a) Provide advice and assistance as required to the Camp Desert Rock staff during the planning and preparatory phases of the exercise.

(b) Deliver explanatory talks to the observers who visit various test positions concerning the effects of the explosion on equipment and materiel in the positions.

(c) Assist technical service evaluators in assessing damage to their equipment and materiel in test positions.

(d) Prepare, from data gained in the test positions and from other sources, a comprehensive report of the effects test of Desert Rock II.

(3) Technical Service Damage Evaluators ✓

(a) Make a detailed evaluation of damage for all items in test position and record same on Final Damage Assessment Form (Annex 5).

(b) When all items of equipment and materiel for a Tech Service have been evaluated, and when movement clearance has been given by O.I.C. Effects Test, request Chief of Tech Service concerned for personnel and vehicles to evacuate the items to Camp Desert Rock. Disposition of items that cannot be radiologically cleared will be in accordance with instructions given by the O.I.C. Effects Test.

EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK II

(c) Complete remaining damage assessment at camp.

(d) Turn in Final Damage Assessment Forms and Tech Service report to O.I.C. Effects Tests.

(4) O.I.C. Effects Tests

(a) Effect coordination between Hq Camp Desert Rock and the AFSWP Advisory Group on matters pertaining to testing of equipment and materiel.

(b) Coordinate and supervise the preparation of damage assessment reports.

(c) Obtain identification tags for each coded item of equipment and materiel within his test position from S-3 section; Hq Camp Desert Rock; tag each item of equipment and materiel when it has been placed in the test position by the Technical Services on D-1, in accordance with the cataloging plan (Annex 3) and equipment location charts (Annex 1); place ground pins in the ground (marking the pre-shot location of all small items that are likely to be displaced by the explosion) with duplicate dog tags affixed to the ground pins.

(d) Insure by checking on D-2 (and D-1) that all equipment and materiel has been placed in position according to plan (Annex 1), and offer any assistance required by Technical Service representatives to facilitate their task of moving equipment and materiel into position.

(e) Insure that all personnel who are to move into his position assemble properly in the march serial for movement from camp, according to the Control Group Movement Plan (Annex 7).

(f) Insure that a guard for each position is posted in his area at 1600 hours D-2. The guards will insure that no unauthorized persons enter the area, and that no equipment or materiel is moved without authority of the test position O.I.C. The guards will be relieved during the night D-1 - D-day, upon direction from Camp Desert Rock S-3. They will be re-posted after D-day, and maintained until relieved by test position O.I.C.

(g) Coordinate and assist members of the evaluation team at his position by insuring that:

1. Final Damage Assessment Forms (Annex 5) are prepared for each item of equipment and materiel in his position, and are turned into the O.I.C. Effects Tests.

2. All administrative assistance to insure the successful accomplishment of the evaluation team's task is provided promptly.

(h) Insure that all equipment and materiel is evacuated from the positions after proper release by monitors and moved to camp by the technical services concerned. Equipment and materiel damaged or rendered unserviceable will be surveyed.

(5) O.I.C. Film Badges for Equipment

(a) Insure that Chemical Officer places film badges according to plan on D-1 (Annex 8, Film Badge Placement Plan).

(b) Insure that film badges are collected after D-day, and turned in to the film badge laboratory at the ABC C.P.

(c) Obtain the film badge report from the laboratory, and turn it in to the O.I.C. Effects Tests (copy to AFSWP Advisory Group Chief) for inclusion in the final report.

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EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK II

(6) O.I.C. Monitors (Chemical Officer)

(a) Insure that position monitors keep the position O.I.C. advised of radiation level and total amount received at suitable time intervals, and give immediate warning at any time the prescribed maximum safe level is reached.

(b) Instruct position monitors to advise tech service evaluators of residual radiation, if any, on or in any piece of equipment for incorporation in damage assessment reports.

(c) Instruct position monitors to give clearances to Tech Service evaluators, from a radiological contamination standpoint, for movement of equipment and material items back to camp.

(7) O.I.C. Photography

(a) Supervise execution of photographic coverage plan (Annex 9).

(b) Arrange that prints of all shots are provided by AEC within reasonable time for inspection by Camp Desert Rock staff members concerned, and that sufficient quantities of prints selected for report purposes are produced.

(c) Upon AEC clearance to revisit the area, instruct all photographic teams who may be required to move from one test position to another to clear with the position O.I.C. before movement.

(d) Make necessary arrangements in advance with Camp Desert Rock Air Officer for helicopter use when necessary.

(8) O.I.C. Administrative Support (Deputy Camp Commander)

(a) Insure that necessary vehicles for movement to test positions are provided by Camp Desert Rock Transportation Officer, and are assembled for movement in proper order (Annex 7).

(b) Insure that equipment movement plan from camp to test positions on D-3 and return on D+1 is effected (Annex 6).

(c) Provide an emergency assistance station for operation on D-day at observation position containing ambulance, engineer squad truck, personnel and pioneer tools, medical aid man, and emergency supply of gasoline, oil and water for evaluation team vehicles.

(d) Provide clip boards and tape measures for test evaluation personnel requiring same.

6. Miscellaneous Details for Damage Evaluation

a. It will be necessary to take measurements, to the nearest foot, to record the displacement distance of equipment moved by the explosion.

b. Every effort will be made by all concerned to prevent movement of test items until all observers have passed through the test position and all measurements and photographs have been taken. However, should an item have to be picked up or moved in any way to accomplish damage assessment it will be replaced in the attitude in which found after the explosion as soon as such damage assessment is completed. Small articles which may have been strewn about by the blast and are in danger of being trampled and further damaged by observer groups will be prominently marked in some suitable fashion to minimize this possibility.

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EQUIPMENT TEST PLAN EXERCISE DESERT ROCK II (Cont)

7. Demobilization

a. Equipment and materiel will be moved out of positions 1-6 when damage assessment is completed. However, test position O.I.C.'s will not permit removal of test items until radiologically cleared for movement by the position monitor.

b. Salvage of emplacement lumber, all sand bags and tactical wire will be commenced by 231 Engr (C) Bn. upon clearance with each position O.I.C., and continued on all available subsequent working days until completed and turned in to camp engineer dump. Emplacement holes will be backfilled and leveled.

c. Test items recovered by tech services will be picked up on appropriate property accounts if serviceable or repairable, or evacuated as salvage if un-repairable.

8. Safety Measures ✓

a. Radiological Safety (RadSafe) monitoring for entire area will be accomplished before evaluation personnel, or any other personnel, are permitted to enter. In addition, one monitor will be continually stationed in each position while evaluation personnel are present. Details of RadSafe plan are contained in tactical plan Operation Desert Rock II.

b. Vehicles speeds on dirt roads will be kept below 15 MPH.

c. Fire and casualty personnel will be on call at Engr unit at YUCCA PASS.

d. If for any emergency reason the forward area must be evacuated on D-day, "Emergency Operation Plan Black" will be put into effect. Upon receipt of word that "Condition Black" is in effect, or observation of a red star cluster pyrotechnic signal, O.I.C.'s at each position will assemble all personnel in their position, load them in available vehicles, and proceed directly to Camp Desert Rock.

e. When decontamination of vehicles becomes necessary, the Decontamination Plan (see Annex 10) will be in effect.

FITCH
Brig. General

Annexes:

- 1 - Position Layouts
- 2 - Admin. Relationships Chart (S-3 to prepare)
- 3 - Catalogue of Equipment
- 4 - Preliminary Damage Assessment Work Sheet
- 5 - Final Damage Assessment Form
- 6 - Equipment Movement Plan
- 7 - Control Group Movement Plan (S-3 to prepare)
- 8 - Film Badge Placement Plan
- 9 - Photography Coverage Plan
- 10 - Decontamination Plan

OFFICIAL:

SMITH
S-3

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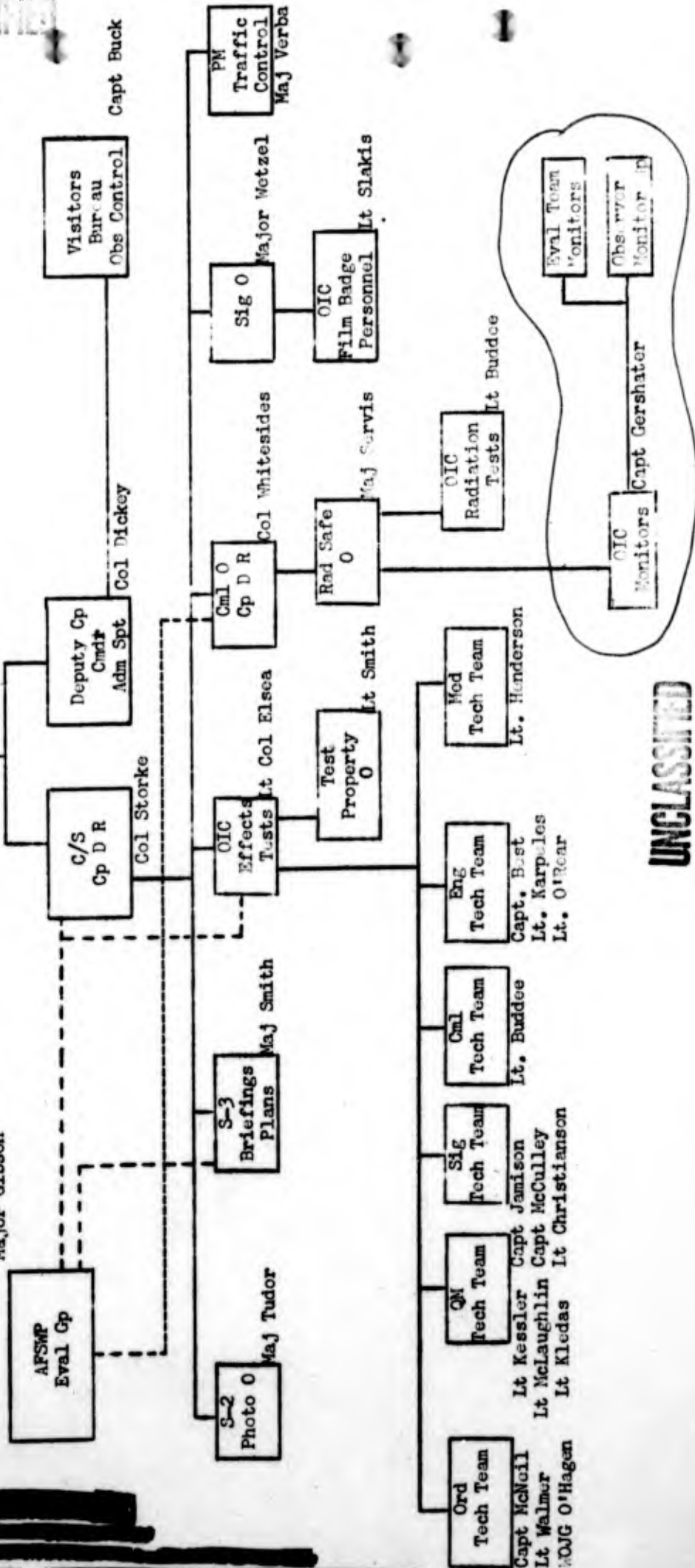
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ADMINISTRATIVE RELATIONSHIP CHART

ANNEX 2 To Equipment Test Plan

Exercise Desert Rock II

Lt Col Brunsvoild Inf
Lt Col Mc Donnell MC
Major Gibson



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HEADQUARTERS
Camp Desert Rock
Las Vegas Nevada

Annex 3

10 November 1951

CATALOGUE OF EQUIPMENT

AT TEST POSITIONS NUMBERS 1, 2, 3, 4, 5, 6

DESERT ROCK EXERCISE II Test No 1

ITEM	PSN 1	PSN 2	PSN 3	PSN 4	PSN 5	PSN 6
Compass Lensatic	1A-1	2A-1	3A-1	4A-1	5A-1	6A-1
Compass Lensatic (Surface)	1A-2	2A-2	3A-2	4A-2	5A-2	6A-2
Canned rations	1A-3	2A-3	3A-3	4A-4	5A-3	6A-3
Canned rations (Surface)	1A-4	2A-4	3A-4	4A-4	5A-4	6A-4
Can, water 5 gal	1A-5	2A-5	3A-5	4A-5	5A-5	6A-5
Can, water 5 gal (Surface)	1A-6	2A-6	3A-6	4A-6	5A-6	6A-6
Can, water 5 gal (Open)	1A-7	2A-7	3A-7	4A-7	5A-7	6A-7
Can, water 5 gal (Surface, open)	1A-8	2A-8	3A-8	4A-8	5A-8	6A-8
Perishable rations	1A-9	2A-9	3A-9	4A-9	5A-9	6A-9
Perishable rations	1A-10	2A-10	3A-10	4A-10	5A-10	6A-10
Perishable rations	1A-11	2A-11	3A-11	4A-11	5A-11	6A-11
Perishable rations	1A-12	2A-12	3A-12	4A-12	5A-12	6A-12
Machine gun, w/mount	1B-1	2B-1	3B-1	4B-1	5B-1	6B-1
Machine gun, w/mount (Surface)	1B-2	2B-2	3B-2	4B-2	5B-2	6B-2
<i>Surface</i> EE-8 Telephone	1C-1	2C-1	3C-1	4C-1	5C-1	6C-1
SCR-536 (Surface)	--	--	3C-2	--	5C-2	--
SCR 536	--	--	3C-3	--	5C-3	--
SCR-300 (Surface)	--	--	4C-2	4C-2	--	6C-2
SCR-300	--	--	--	4C-3	--	6C-3
Dummy in hole with:						
Jacket HBT	1D-1	2D-1	3D-1	4D-1	5D-1	6D-1
Trousers HBT	1D-2	2D-2	3D-2	4D-2	5D-2	6D-2

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-Page 2-

CATALOGUE OF EQUIPMENT

AT TEST POSITIONS NUMBERS 1, 2, 3, 4, 5, and 6

DESERT ROCK EXERCISE II Test No 1

Dummy in hole with:	PSN 1	PSN 2	PSN 3	PSN 4	PSN 5	PSN 6
Helmet	1D-1	2D-1	3D-1	4D-1	5D-1	6D-1
M-1 rifle	1D-4	2D-4	3D-4	4D-4	5D-4	6D-4
Gas Mask (AG)	1D-5	2D-5	3D-5	4D-5	5D-5	6D-5
Dummy on surface with:						
Jacket HBT	1D-6	2D-6	3D-6	4D-6	5D-6	6D-6
Trousers HBT	1D-7	2D-7	3D-7	4D-7	5D-7	6D-7
Helmet	1D-8	2D-8	3D-8	4D-8	5D-8	6D-8
M-1 rifle	1D-9	2D-9	3D-9	4D-9	5D-9	6D-9
Gas mask (AG)	1D-10	2D-10	3D-10	4D-10	5D-10	6D-10
Tent, shelter (Surface)	1D-11	2D-11	3D-11	4D-11	5D-11	6D-11
Recoilless rifle	1E-1	2E-1	3E-1	4E-1	5E-1	6E-1
Sniperscope (Surface)	---	2E-2	3E-2	---	---	---
Below EE-8 Telephone	1F-1 ✓	2F-1 ✓	3F-1	4F-1	5F-1	6F-1
Surface Coil No. 114 (Surface)	1F-2 ✓	2F-2 ✓	3F-2	4F-2	5F-2	6F-2
Below Coil No. 114	1F-3 ✓	2F-3 ✓	3F-3	4F-3	5F-3	6F-3
Surface Coil No. 114 (Surface)	1F-4 ✓	2F-4 ✓	3F-4	4F-4	5F-4	6F-4
Below Coil No. 114	1F-5 ✓	2F-5 ✓	3F-5	4F-5	5F-5	6F-5
Surface Circuit WD-1 wire (Surface)	1F-6 ✓	2F-6 ✓	3F-6	4F-6	5F-6	6F-6
Below Circuit WD-1 wire (Buried 8")	1F-7 ✓	2F-7 ✓	3F-7	4F-7	5F-7	6F-7
Surface Circuit 110B wire (Surface)	1F-8 ✓	2F-8 ✓	3F-8	4F-8	5F-8	6F-8
Below Circuit 110B wire (Buried 8")	1F-9 ✓	2F-9 ✓	3F-9	4F-9	5F-9	6F-9
Surface Circuit Sp 4 (old) (Surface)	1F-10 ✓	2F-10 ✓	3F-10	4F-10	5F-10	6F-10
Below Circuit Sp 4 (old) (Buried 8")	1F-11 ✓	2F-11 ✓	3F-11	4F-11	5F-11	6F-11
Surface Circuit Sp 4 (new) (Surface)	1F-12 ✓	2F-12 ✓	3F-12	4F-12	5F-12	6F-12

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-Page 3-

CATALOGUE OF EQUIPMENT (Cont'd)

ITEM	PSN 1	PSN 2	PSN 3	PSN 4	PSN 5	PSN 6
<i>Below</i> Circuit Sp 4 (new) (Buried 8")	1F-13 ✓	2F-13 ✓	3F-13 ✓	4F-13 ✓	5F-13 ✓	6F-13 ✓
<i>Below</i> Circuit W-143 (Surface)	1F-14 ✓	2F-14 ✓	3F-14 ✓	4F-14 ✓	5F-14 ✓	6F-14 ✓
<i>Below</i> Circuit W-143 (Buried 8")	1F-15 ✓	2F-15 ✓	3F-15 ✓	4F-15 ✓	5F-15 ✓	6F-15 ✓
Bailey Bridge	1G-1	—	3G-1	—	—	—
Jeep (Sideways)	—	—	3H-1	4H-1	—	—
Tank (Dug in—	—	2I-1	3I-1	—	—	—
(On Surface—	—	5I-1	6I-1	—	—	—
Trk 2½ ton	—	—	3J-1	4J-1	5J-1	6J-1
Jeep (end on)	1K-1	2K-1	—	—	5K-1	6K-1
105 MM How.	—	2L-1	3L-1	—	—	—

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11 November 1951

EQUIPMENT EMPLACEMENT PLAN

1. Test items will be moved and installed in site of Test No. 1, Desert Rock Exercise II according to following schedule.

(a) To be in place ready for test no later than 1630 12 Nov 51.

<u>TECH SERVICE</u>	<u>ITEM</u>	<u>NO.</u>	<u>POSITION</u>
<u>ORDNANCE</u>	Tanks	4	2,3,5,6
	Trks 2½ ton	4	3,4,5,6
	Trks ½ ton	2	3,4; (sideways)
	Trks ¼ ton	4	1,2,5,6 (end on)
	105 MM How	2	3,4
<u>ENGINEER</u>	Bailey Bridge	2	1,3
	Barbed wire	3	2,3,6

(b) To be in place ready for test no later than 1200 14 Nov 51
(Note: movement may begin 0700 14 Nov 51)

<u>TECH SERVICE</u>	<u>ITEM</u>	<u>NO.</u>	<u>POSITION</u>
<u>ORDNANCE</u>	Machine guns	12	1,2,3,4,5,6
	M-1 rifles	24	1,2,3,4,5,6
	Recoilless rifles	6	1,2,3,4,5,6
<u>ENGINEER</u>	Compasses, lensatic	12	1,2,3,4,5,6
	Sniperscopes	2	2,3
<u>CHEMICAL</u>	Gas Masks	12	1,2,3,4,5,6
<u>QUARTERMASTER</u>	Canned rations	12	1,2,3,4,5,6
	Cans, water, 5 gal	24	1,2,3,4,5,6
	Beef	6	2,3,5
	Salt	12	1,2,3,4,5,6
(Clothing dummies)	(Trousers HBT	12	1,2,3,4,5,6
	(Jackets HBT	12	1,2,3,4,5,6
	(Helmets, steel	12	1,2,3,4,5,6
	Tents, shelter	-	-
	(complete)	6	1,2,3,4,5,6
<u>SIGNAL</u>	EE-8 Telephone	12	1,2,3,4,5,6
	Coils No. 114	24	1,2,3,4,5,6
	Circuits WD-1 wire	12	1,2,3,4,5,6
	Circuits 110B wire	12	1,2,3,4,5,6
	Circuits Sp 4 (old)	12	1,2,3,4,5,6
	Circuits Sp 4 (new)	12	1,2,3,4,5,6
	Circuits W-143	12	1,2,3,4,5,6
	SCR-536	4	3,5
	SCR-300	4	4,6

2. Technical service staff chiefs are responsible for emplacement of property belonging to their particular technical service. However, emplacement of materiel by tech service staff chiefs must be coordinated with OIC Effects Tests, (Lt Col. Carl A. Elsen, Cp Desert Rock Engr O) and his assistant (1st Lt. Wesley L. Smith QMC, Test Property Officer).

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EQUIPMENT EMPLACEMENT PLAN (cont'd)

3. Equipment and materiel will be placed according to plans prepared by S-3. Copies of plans are available to staff chiefs at S-3 Office.

4. All items when emplaced will be marked with a metal tag (dog-tag) designated by code number. A duplicate of this tag will be pinned to the ground beneath the item. These tags will be available 12 November 1951, at S-3 Office.

FITCH
BRIG GEN

OFFICIAL:

SMITH
S-3

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

ANNEX 9

12 November 1951

PHOTOGRAPHY COVERAGE PLAN FOR DESERT ROCK, EXERCISE II

1. Following is the plan for photographic coverage of Desert Rock Exercise II:

a. Evaluation and Effects Photography: Six 4 x 5 contact prints each to be made from approximately 1,200 negatives covering military test positions during the two tests at the Nevada Test Site will be required for Effects and Evaluation Reports. This coverage has been coordinated with AEC representatives and will be accomplished by photographers of Graphic Arts Group, Los Alamos Scientific Laboratories, including processing of negatives and prints.

b. Public Information Photography: Prints made from approximately fifty negatives will be required for PIO release during this exercise. Print requirements will vary from three to twenty-five per negative, either 4 x 5 contact prints, or 8 x 10 enlargements. Subjects will be of Camp Desert Rock activities. Subjects should include VIP observers at the forward position. This last requirement is coordinated with AEC representatives.

c. Motion Picture Photography: None is recommended since approximately 30,000 feet of 35mm motion picture film covering all phases of Camp Desert Rock were exposed by the Signal Corps Photographic Center Special Coverage Unit during Exercise Desert Rock at the time of peak activity.

2. Photographic personnel required to accomplish photography listed in paragraph 1 above:

a. (Refer to paragraph 1a, Evaluation and Effects Photography) All personnel, equipment and supplies to be furnished by Graphic Arts Group, Los Alamos Scientific Laboratories, with the exception of four jeeps to be furnished by Hq. Camp Desert Rock during photographic operations.

b. (Refer to paragraph 1b, PIO Photography.) One still cameraman (MOS 3152, attached to Hq. Camp Desert Rock) will be required to accomplish PIO Photography for Camp Desert Rock during Desert Rock Exercise II.

c. Arrangements have been made with Nellis Air Force Base Photo Laboratory to process and print the pictures listed in para 1b, so no laboratory facilities and/or darkroom personnel will be required at Camp Desert Rock.

ANNEX 9

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EFFECTS AND EVALUATION
PHOTOGRAPHY FOR DESERT ROCK EXERCISE II

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1. Negative Requirements

SUBJECT	TEST NO. I		TEST NO. II	
	Before (D-1)	After (D-1)	Before (D-1)	After (D-1)
Test Position No. 1 (12 sub-areas per position for positions 1-7, incl.)	24	36	24	36
Test Position No. 2.	24	36	24	36
Test Position No. 3	24	36	24	36
Test Position No. 4	24	36	24	36
Test Position No. 5	24	36	24	36
Test Position No. 6	24	36	24	36
Test Position No. 7	--	--	24	36
Foxholes (46, containing film badges only)	46	92	46	92
Aerial photographs, low altitude (helicopter), 2 per position and foxhole layout before and 3 per position and foxhole layout after	14	21	16	24
VIP's at test position during detonation. (for PIO release)	--	6	--	6
Vehicle Decontamination	--	12	--	12
	204	342	230	386
Negatives per Test	551		616	
Total Negatives			1,167	

2. Print Requirements

Six 4 x 5 contact prints from each of the negatives listed above will be required as soon as possible after the tests are completed. These prints will be used for Effects and/or Evaluation Reports. Coordination will be effected with A-C representatives to secure earliest release of VIP photographs taken at the Test Site.

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FIN L DAMAGE ASSESSMENT FORM

ANNEX 5

I - BASIC DATA

1. Item: _____ 2. Position: _____
3. Item catalog code no.: _____ 4. Service: _____
Above Below
5. Emplacement name _____ 6. surface _____ 7. surface _____
8. Damage assessor's name: _____ 9. Grade: _____ 10. Service: _____

II DAMAGE ASSESSMENT

11. Item was undamaged: (yes) (no) 12. Explosion moved item: (yes)(no)(feet) _____
13. Item has residual radiation: (yes) (no) 14. Amount: _____ mr
15. Item is cleared for evacuation to Cp Desert Rock: (yes) (no) _____
16. Name of radiological check monitor _____
17. Description of damage; covering extent of burning or charring; extent of "sandblast" effects; structural crushing, denting or breakage; functional failures; fuel tank; fuel reserve: _____

III - SERVICEABILITY

18. Item is immediately combat serviceable: (yes) (no) _____
19. For combat serviceability, item requires: 1st ech parts 2nd ech parts
3rd ech parts 4th or 5th ech parts Replacement entirely! Decontaminating
20. Final disposition of item: _____

Signature of Damage Assessor

1. Report negatively if necessary, for each type of damage.
2. Evac to Cp Desert Rock; destroyed in place; buried at site.

ANNEX 5

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HEADLINE POWER

ANNEX 4

Date _____

התאחדות העובדים

PRELIMINARY DAMAGE ASSESSMENT

Observer, Name, Rank, Organization

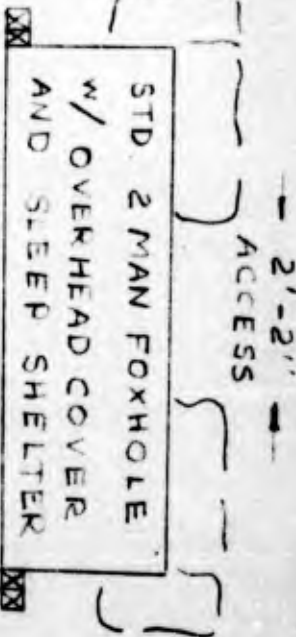
* Original Location - above or below surface.

Annex 4

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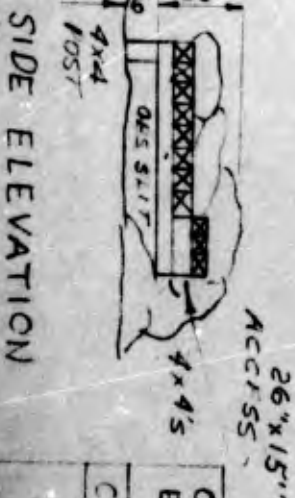


PLAN



VIEW OF REAR ACCESS

LONGITUDINAL SECTION
 Observ Post: including overhead shelter
 sleeping shelter 6" slit front & sides.
 POSITION FULLY REVETTED

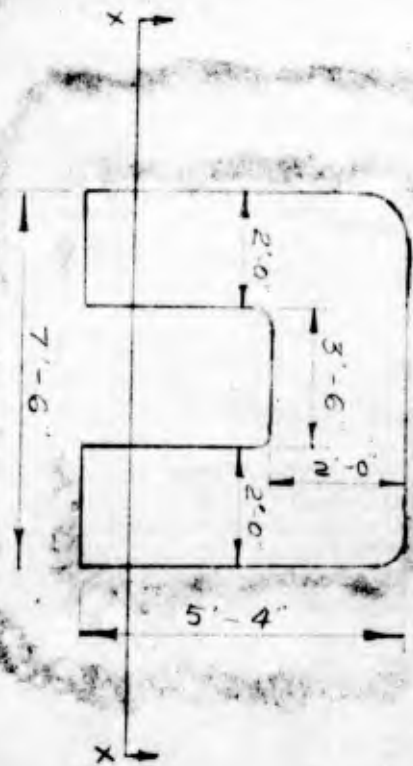


OBSERVATION POST EXERCISE DESERT ROCK II NOVEMBER 1981	CAMP DESERT ROCK, NEV
SMITH, S-3 Maj, Arty	FITCH Brig Gen

UNCLASSIFIED

UNCLASSIFIED

SAND BAGGED
PARAPET



TOP
VIEW

HORSESHOE TYPE MG EMPLACEMENT
FIG 38 PAGE 80 515

SECTION X-X



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MG EMPLACEMENT

EXERCISE DESERT ROCK II

NOVEMBER 1951

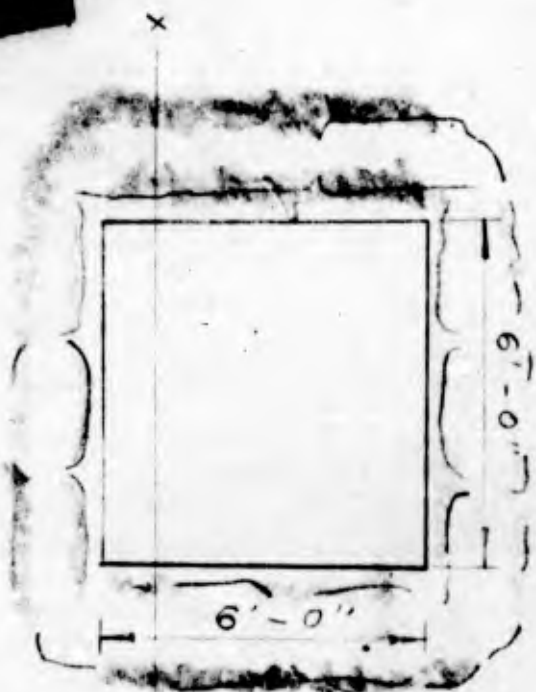
CAMP DESERT ROCK, NEW

FITCH

Engineer

SMITH 5-3
Major Artillery

UNCLASSIFIED



TOP VIEW



SECTION X-X



81 MM MORTAR EMPLACEMENT

F. 46 P. 25 FM 5-15

UNCLASSIFIED

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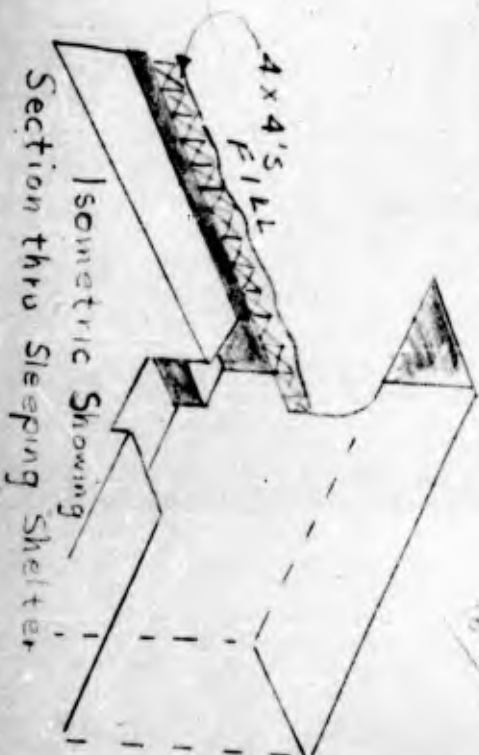
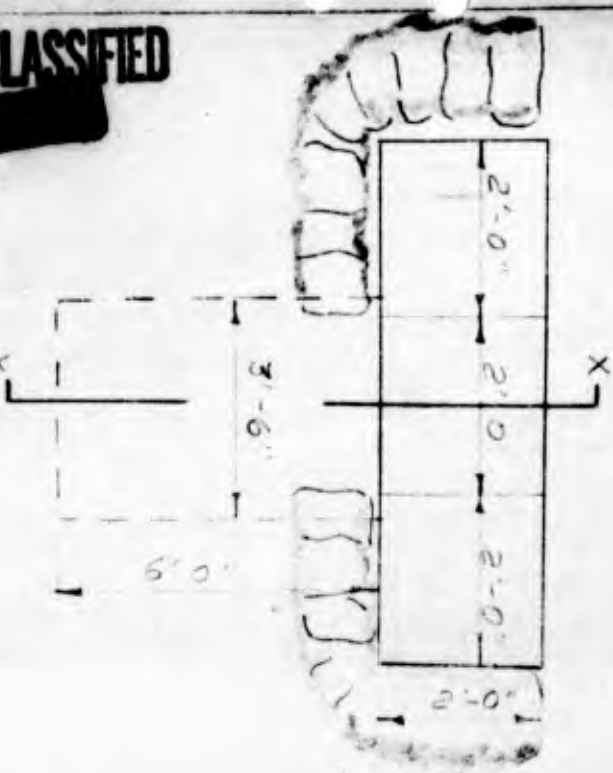
81 MM MORT EMP.
EXERCISE DESERT ROCK II
NOVEMBER 1951
CAMP DESERT ROCK, NEV.

FITCH
20354

SMITH 3-3
H-1 A-14

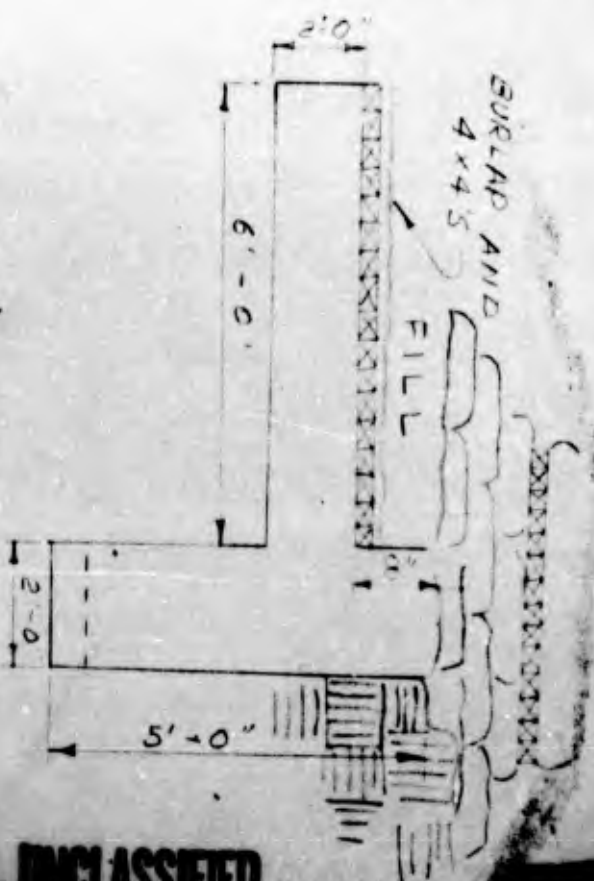
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TOP VIEW



SECTION X-X

Two-Man Foxhole with overhead cover and sleeping shelter



Overhead Cover

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TWO-MAN FOX HOLE
EXERCISE DESERT ROCK II
NOVEMBER 1951

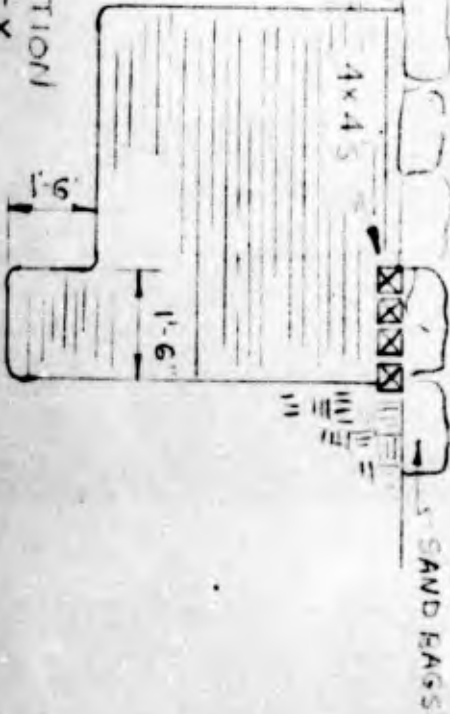
CAMP DESERT ROCK NEW

SMITH S-3
Major Andy

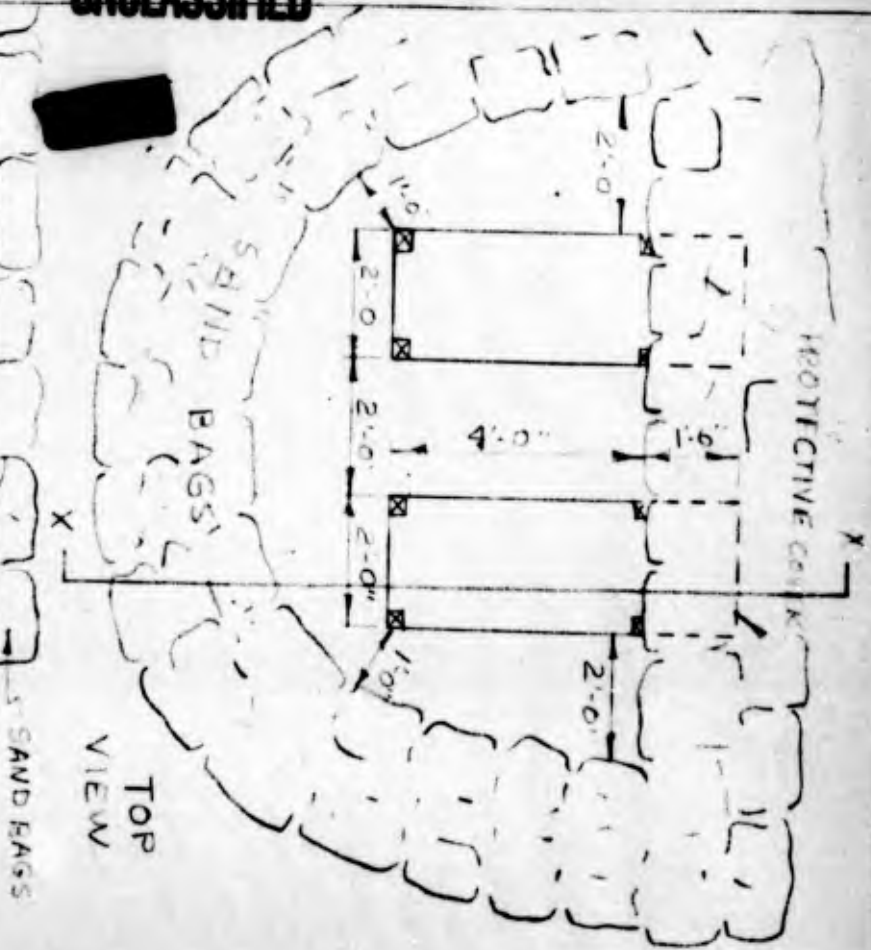
FITCH
Major Gen

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SECTION
X-X



TOP
VIEW



POSITION FULLY REVERTED

FIG. 52 P. 101 FM 5-15

ISOMETRIC

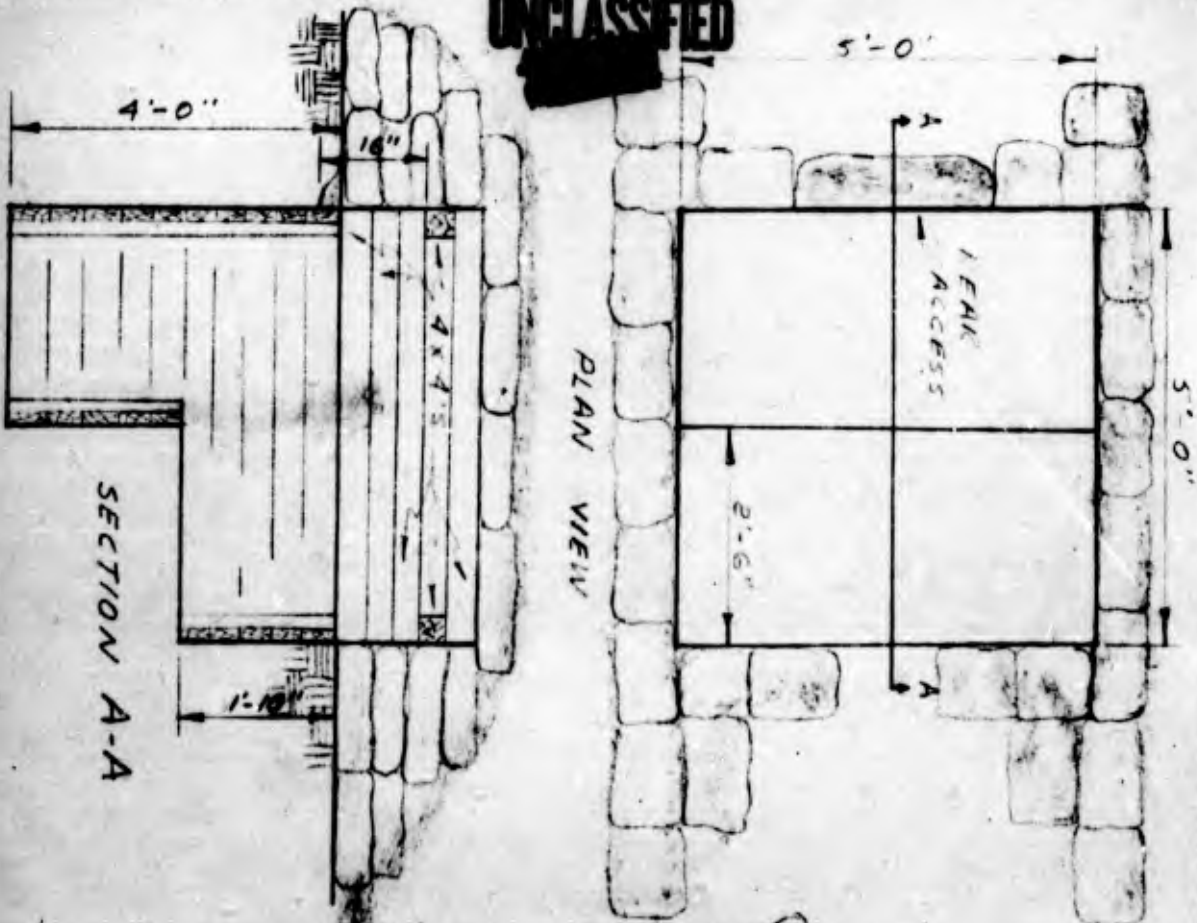


2-FOX HOLE TYPE 57-75 RR PSN
EXERCISE DESERT ROCK II.
NOVEMBER 1951
CAMP DESERT ROCK, NEW.
SMITH S.3
Fitg Gen

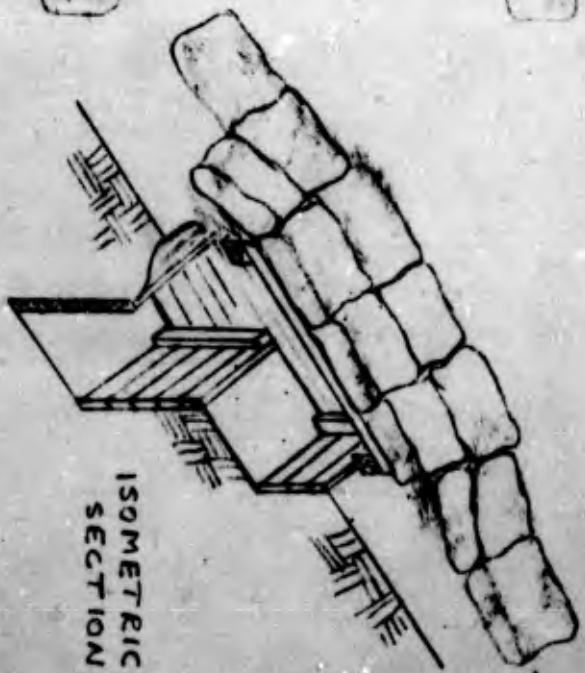
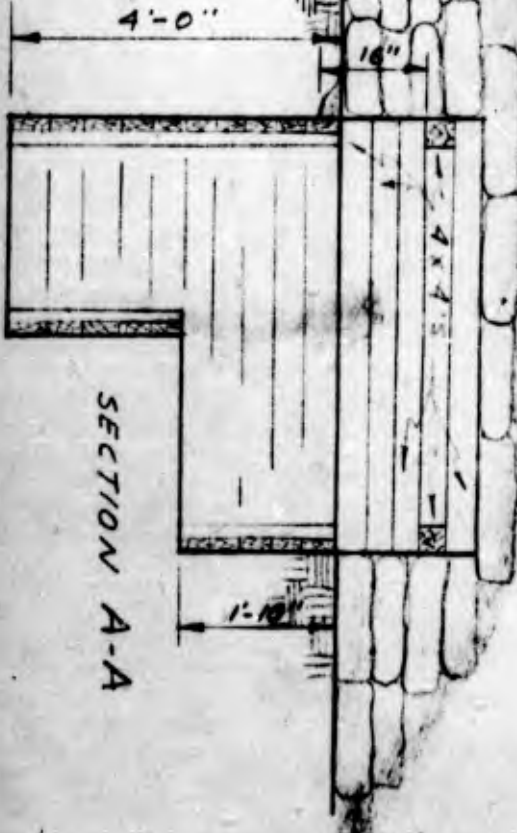
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PLAN VIEW



SECTION A-A



ISOMETRIC OF SECTION A-A

TO FRONT

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SPECIAL MG EMPLACEMENT
EXERCISE DESERT ROCK II
NOVEMBER 1981

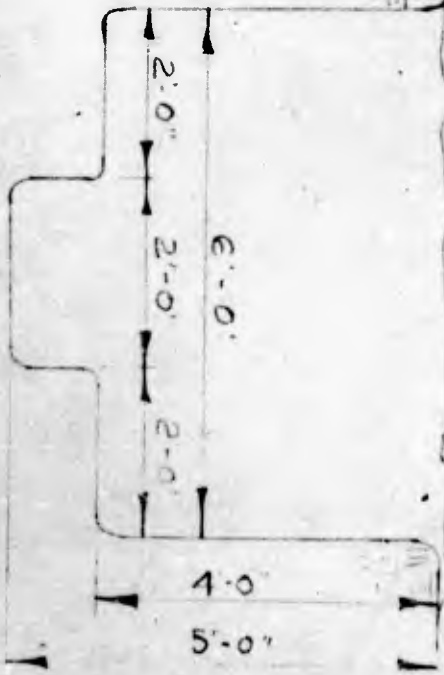
CAMP DESERT ROCK, NEV.

SMITH S-3
MAJ Army

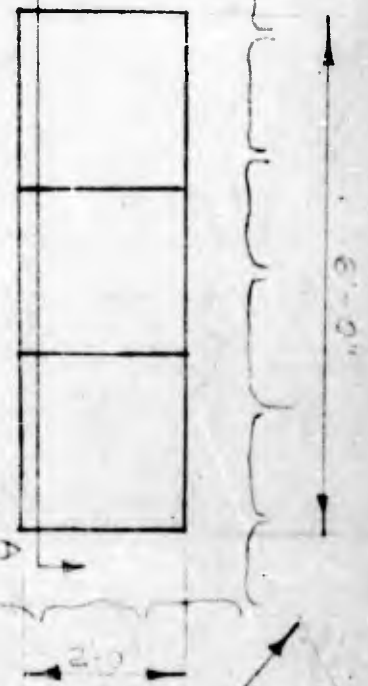
FITCH
Brig Gen

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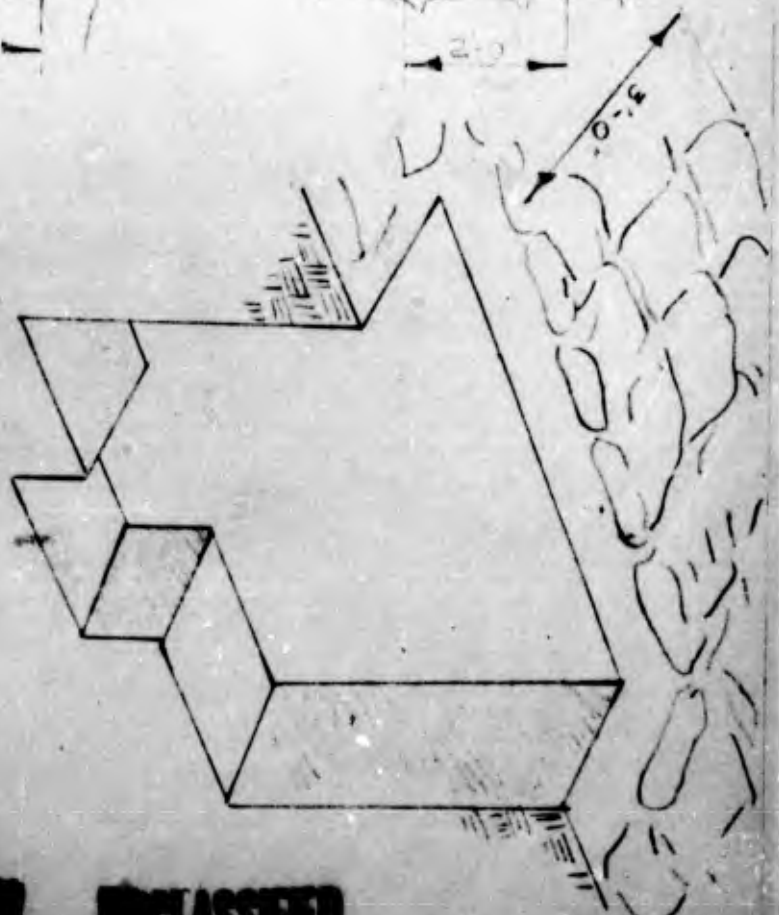
LONGITUDINAL SECTION



TOP VIEW



ISOMETRIC SECTION



TWO MAN-FOX HOLE EXERCISE DESERT ROCK II NOVEMBER 1951
CAMP DESERT ROCK NEW
SMITH S-3 Major Army
FITCH Brig Gen

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PSN # 6

NOTE :

ALL FOX HOLES ARE TO BE BADGED ACCORDING TO TYPICAL LAYOUT.

ALL FILM BADGES ARE TO BE HIGH INTENSITY FILM BADGES IN NATIONAL BUREAU OF STANDARDS FILM BADGE HOLDERS:

OP A
MG EMPL B
BI MORT EMPL C
2 MAN FOXHOLE 1/2 D
57 & 75mm RR EMPL E
SPL MG EMPL F

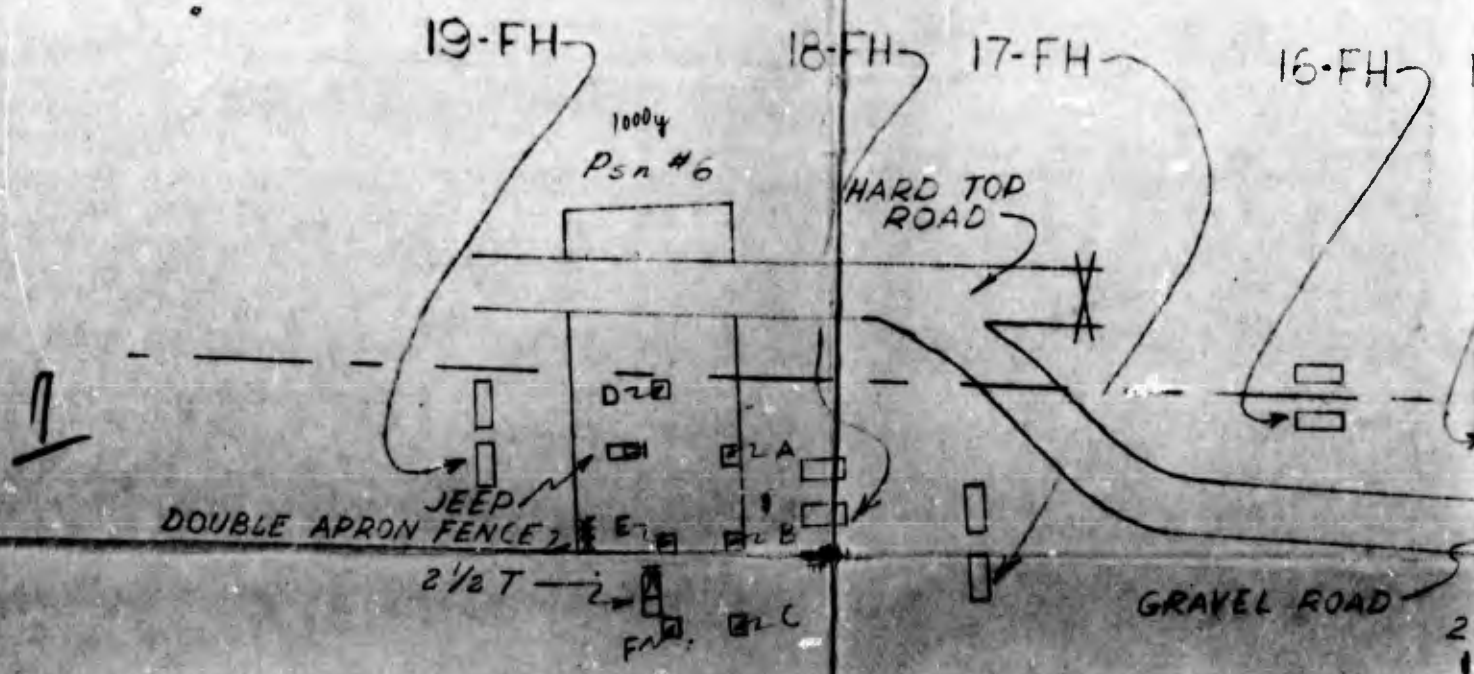
TRUCK 2 1/2 T J
6 X 6

JEEP K

6-A-1 to 5 See typical layout
6-B-1 to 5 See typical layout
6-C-1 to 5 See typical layout
6-D-1 to 5 See typical layout
6-E-1 to 5 See typical layout
6-F-1 to 5 See typical layout

6-J-1 Drivers seat
6-J-2 Back of drivers seat
6-J-3 Passenger seat
6-J-4 Back of passenger seat
6-J-5 On motor block

6-K-1 Drivers seat
6-K-2 Back of drivers seat
6-K-3 Passenger seat
6-K-4 Back of passengers seat
6-K-5 On motor block



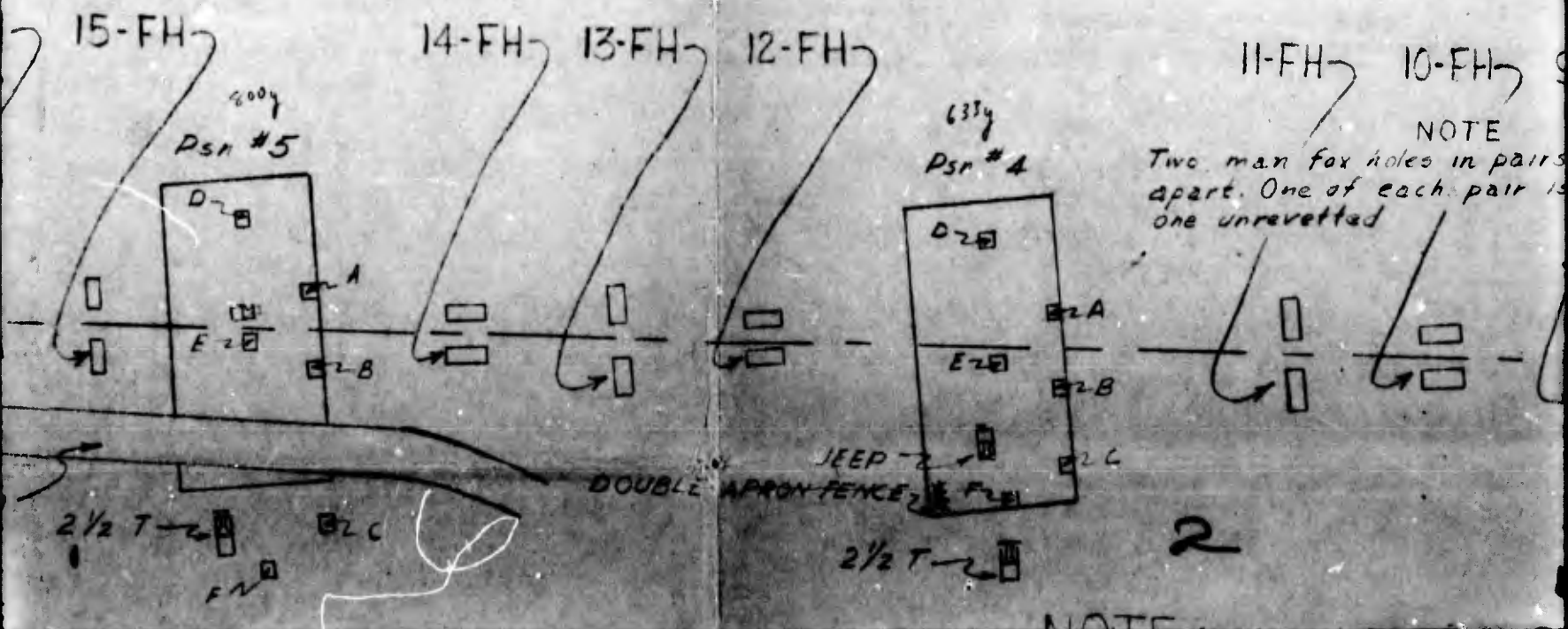
UNCLASSIFIED

PSN # 5

			LOCATION
OP	A	5-A-1 to 5	See typical layout
MG EMPL	B	5-B-1 to 5	See typical layout
81 MORT EMPL	C	5-C-1 to 5	See typical layout
2 MAN FOXHOLE 1/2	D	5-D-1 to 5	See typical layout
57175 mm RR EMPL	E	5-E-1 to 5	See typical layout
SPL MG EMPL	F	5-F-1 to 5	See typical layout
TRUCK 2 1/2 T	J	5-J-1	Drivers seat
6 X 6		5-J-2	Back of drivers seat
		5-J-3	Passenger seat
		5-J-4	Back of passenger seat
		5-J-5	On motor block
JEEP	K	5-K-1	Drivers seat
		5-K-2	Back of drivers seat
		5-K-3	Passenger seat
		5-K-4	Back of passenger seat
		5-K-5	On motor block

PSN # 4

			LOCATION
OP	A	4-A-1 to 5	See typical layout
MG EMPL	B	4-B-1 to 5	See typical layout
81 MORT EMPL	C	4-C-1 to 5	See typical layout
2 MAN FOXHOLE 1/2	D	4-D-1 to 5	See typical layout
57175 mm RR EMPL	E	4-E-1 to 5	See typical layout
SPL MG EMPL	F	4-F-1 to 5	See typical layout
JEEP	H	4-H-1	Drivers seat
		4-H-2	Back of drivers seat
		4-H-3	Passenger seat
		4-H-4	Back of passenger seat
		4-H-5	On motor block
TRUCK 2 1/2 T	J	4-J-1	Drivers seat
6 X 6		4-J-2	Back of drivers seat
		4-J-3	Passenger seat
		4-J-4	Back of passenger seat
		4-J-5	On motor block



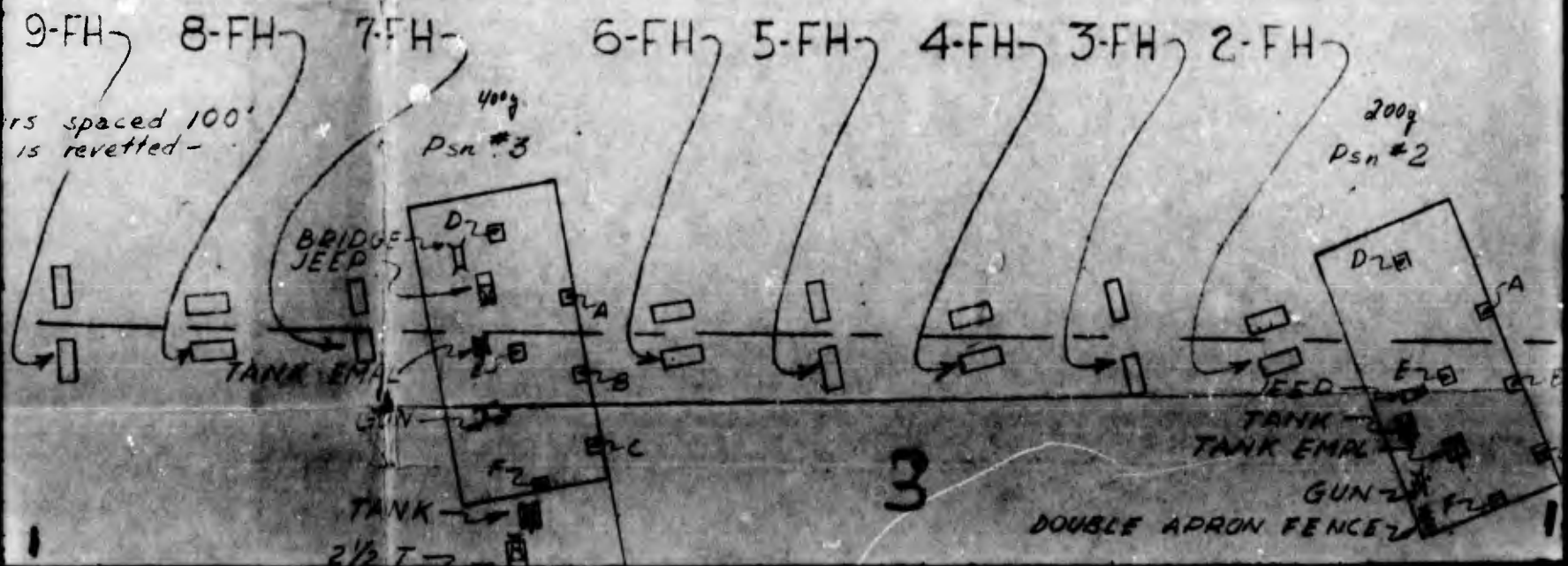
PSN #3

PSN #2

LOCATION

OP	A	3-A-1 to 5	See typical layout
MG EMPL	B	3-B-1 to 5	See typical layout
81 MORT EMPL	C	3-C-1 to 5	See typical layout
2 MAN FOXHOLE %	D	3-D-1 to 5	See typical layout
57475 RR EMPL	E	3-E-1 to 5	See typical layout
SPL MG EMPL	F	3-F-1 to 5	See typical layout
	H	3-H-1 to 5	See typical layout
TANK (dug in)	I	3-I-1	Drivers seat
		3-I-2	Asst driver seat
		3-I-3	Gunners seat
		3-I-4	On radio
		3-I-5	Radio seat
TRUCK 2 1/2 T	J	3-J-1	Drivers seat
6x6		3-J-2	Back of drivers seat
		3-J-3	Passengers seat
		3-J-4	Back of pass. seat
		3-J-5	On motor block
TANK	K	3-K-1	Drivers seat
		3-K-2	Assistant drivers seat
		3-K-3	Gunner seat
		3-K-4	Tank Commanders seat
		3-K-5	Breach of Gun
105mm How	L	3-L-1	Breach
		3-L-2	On left trail
		3-L-3	On right trail
		3-L-4	Behind armor plate
		3-L-5	Behind armor plate

OP	A	2-A-1 to 5
MG EMPL	B	2-B-1 to 5
81 MORT EMPL	C	2-C-1 to 5
2 MAN FOXHOLE %	D	2-D-1 to 5
57475 RR EMPL	E	2-E-1 to 5
SPL MG EMPL	F	2-F-1 to 5
TANK (dug in)	I	2-I-1
		2-I-2
		2-I-3
		2-I-4
		2-I-5
TANK	J	2-J-1
		2-J-2
		2-J-3
		2-J-4
		2-J-5
JEOP	K	2-K-1
		2-K-2
		2-K-3
		2-K-4
		2-K-5



PSN # 1

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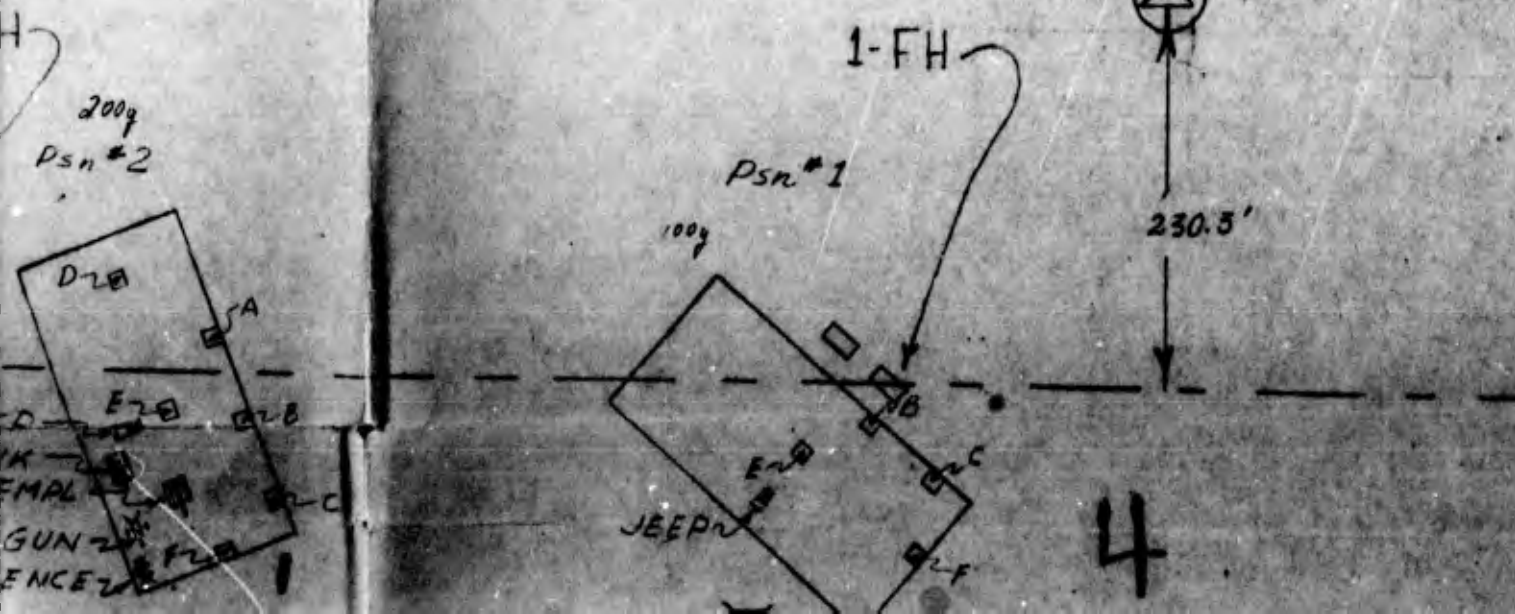
LOCATION

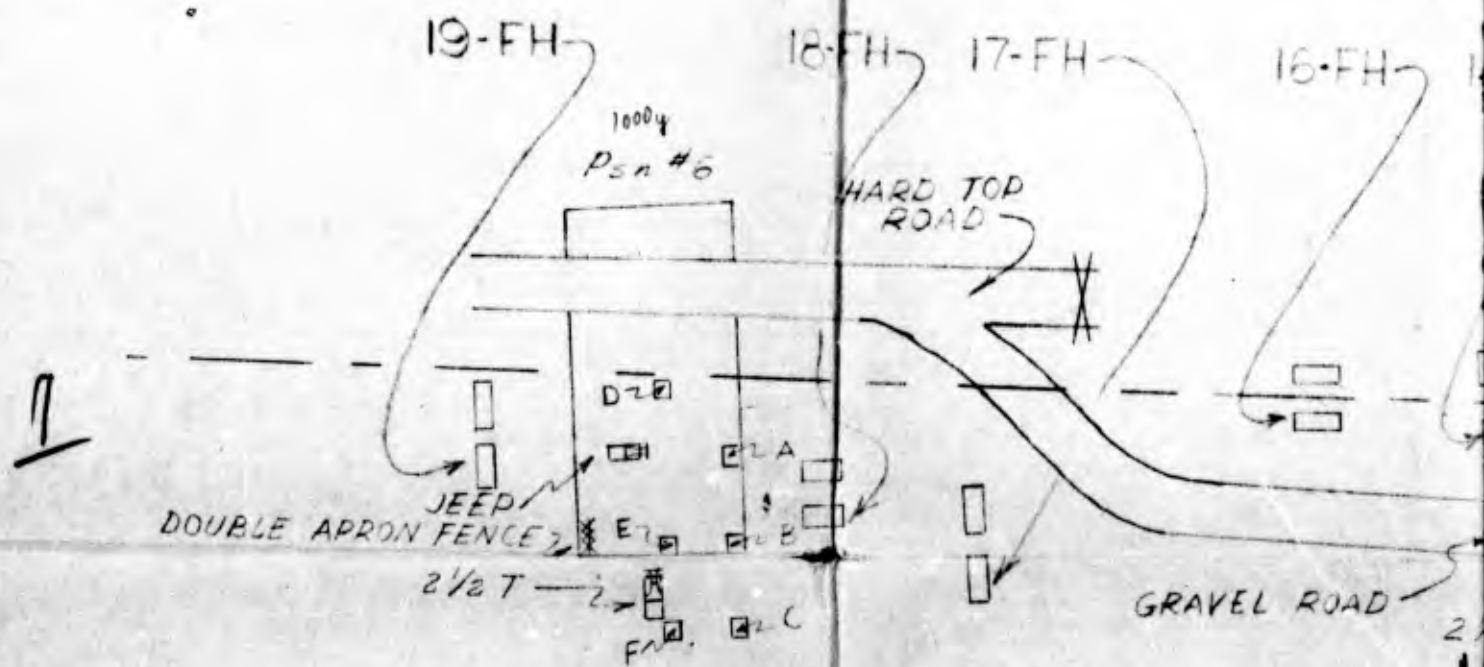
LOCATION

- A -2-A-1 to 5 See typical layout
B -2-B-1 to 5 See typical layout
C -2-C-1 to 5 See typical layout
D -2-D-1 to 5 See typical layout
E -2-E-1 to 5 See typical layout
F -2-F-1 to 5
I -2-I-1 Drivers seat
2-I-2 Asst drivers seat
2-I-3 Turret gunner seat
2-I-4 Asst turret gunner seat
2-I-5 Turret tank commander
J -2-J-1 Drivers seat
2-J-2 Asst drivers seat
2-J-3 Turret gunner seat
2-J-4 Asst turret gunner seat
2-J-5 Turret tank commander
K -2-K-1 Drivers seat
2-K-2 Back of drivers seat
2-K-3 Passenger seat
2-K-4 Back of pass. seat
2-K-5 On motor block

MG EMPL B
SIMORT EMPL C
57+75mm KR EMPL E
SPL MG EMPL F
JEEP K

- 1-B-1 to 5 See typical layout
1-C-1 to 5 See typical layout
1-E-1 to 5 See typical layout
1-F-1 to 5 See typical layout
1-K-1 Drivers seat
1-K-2 Back of drivers seat
1-K-3 Passenger seat
1-K-4 Back of pass. seat
1-K-5 On motor block

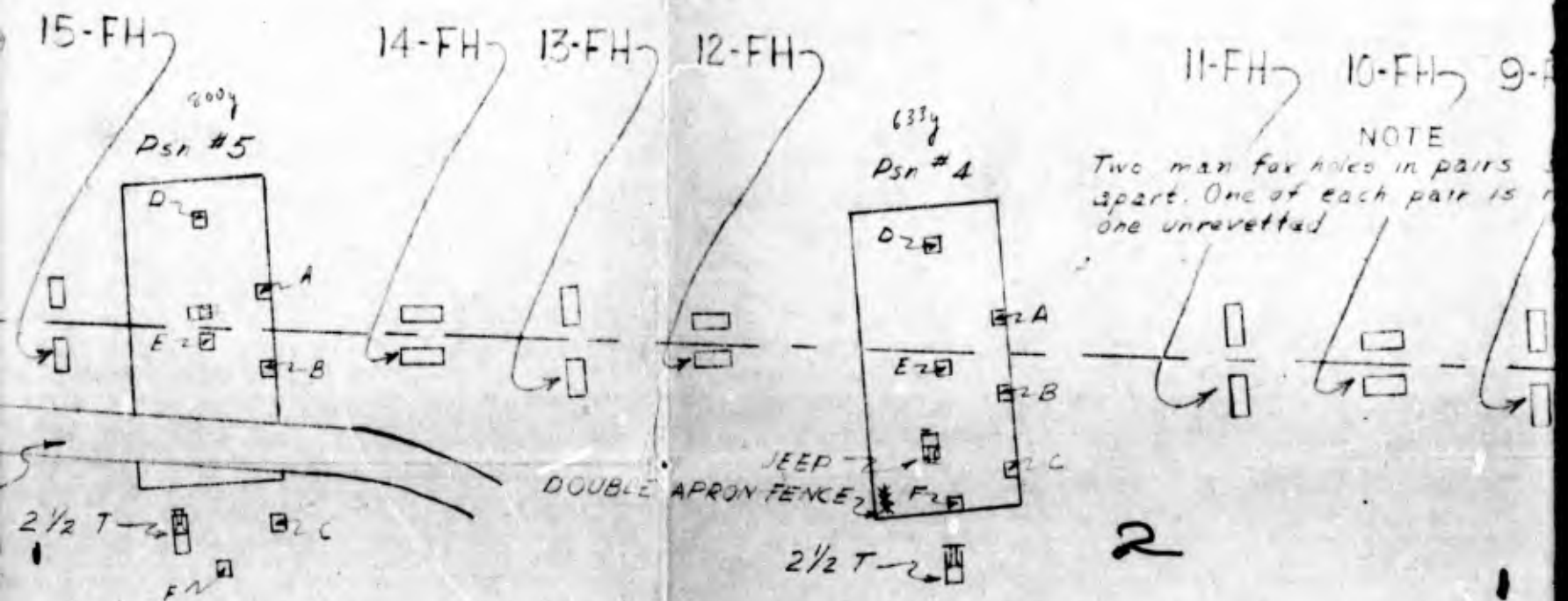




SCALE 1"=100

0 50 100 200

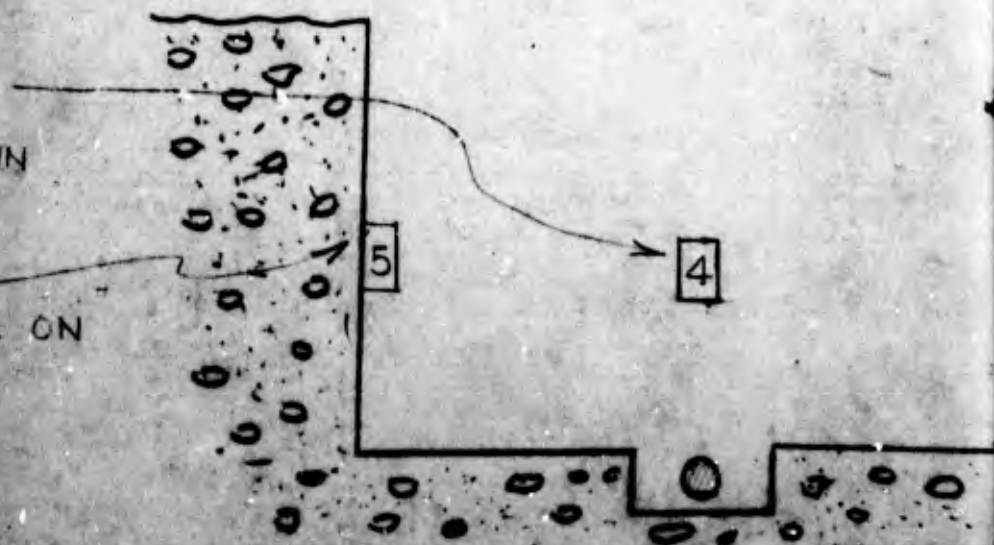
5



NOTE:
TYPICAL LAYOUT OF
BADGES IN CROSS-SECTION
OF EMPLACEMENT

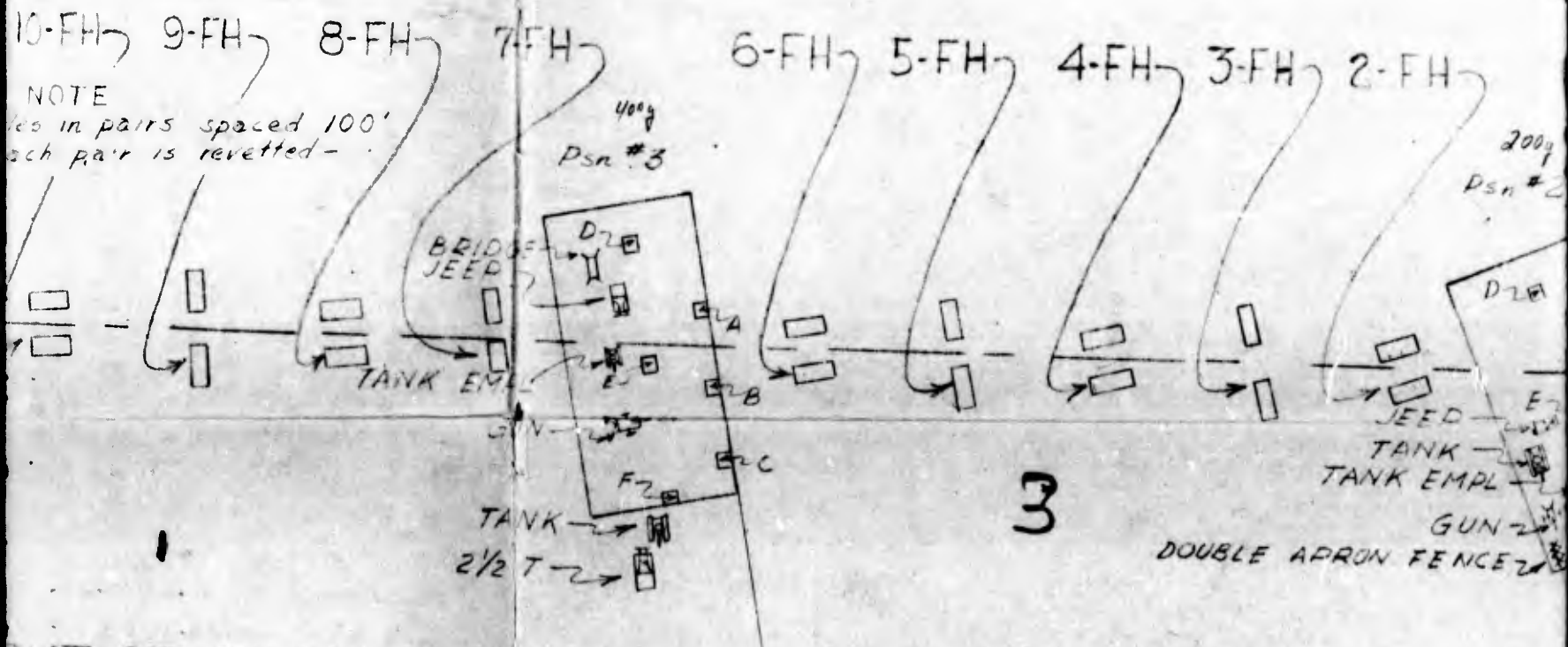
9-FH-4 FILM BADGE
NBS FILM BADGE HOLDER
2 FT FROM BOTTOM ON STOKE IN
MIDDLE OF EMPLACEMENT.

9-FH-5 FILM BADGE
2 FT FROM BOTTOM OF EMP. ON
BACK WALL.

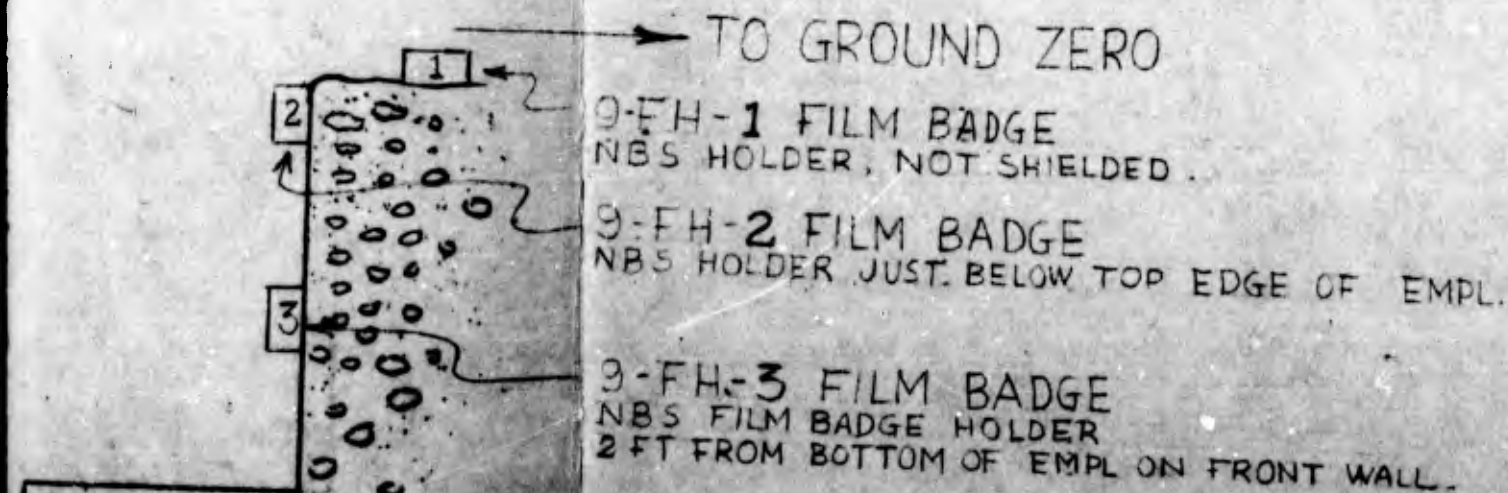


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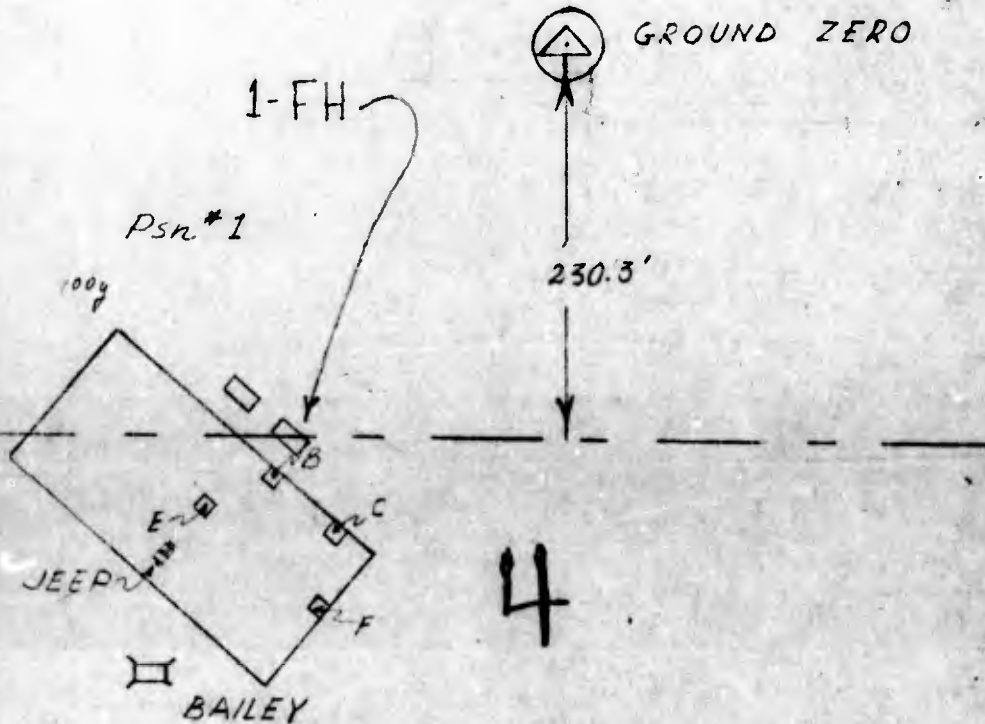
3-L-4 Behind armor plate
3-L-5 Behind armor plate



OUT OF FILM -
OSS-SECTION
ENT



009
#2



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LAYOUT OF FILM BADGE TEST EXERCISE DESERT ROCK II NOVEMBER 1951		
S-3 Section Camp Desert Rock, Nevada		
Surveyed by: 231st ENGR C BN	Drawn by J.W.	Date: 25 NOV 51
Official:		FITCH Brig Gen
SMITH S-3 Maj Arty		

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DESCRIPTION OF SURFACE SHOT AND METEOROLOGICAL CONDITIONS

The surface shot was a detonation of an implosion nuclear fission device which yielded energy equivalent to 1.1 KT of TNT. The shot was fired at 0900 hours Pacific Standard Time on 19 November 1951. The typical flash of visible light resulted, but the fireball was not as symmetrical as those resulting from a high air burst. The air shock wave kicked up a dense cloud of dust out to about 1000 yards, and this obscured completely the high speed photographic coverage focused on the Desert Rock II test positions. Only the planks of the 100-yard Bailey Bridge flying through the air were visible in the moving pictures.

The fireball and associated dust cloud rose rapidly to 11,000 feet above zero point. The cloud sheared at 2,700 feet due to the strong upper level winds. Fall-out from this part of the cloud was responsible for the down-wind residual radioactive contamination. Desert Rock positions were not in the path of the fall-out.

The majority of the fission products were sucked up with the rising fireball, and there was no base surge associated with the explosion.

Atmospheric conditions at 0900P, 19 November 1951.

Pressure at Ground Zero	871.5 milibars
Virtual Temperature at Ground Zero	+ 1.3 C
Actual Temperature at Ground Zero	+ 1.0 C
Dew Point Temperature at Ground Zero	- 9.5 C
Relative Humidity at Ground Zero	47%

Upper level winds, pressures, temperatures and relative humidities:
(Winds in Degrees from true North and Knots; Heights in feet above surface zero)

HEIGHT	WIND	PRESSURE	TEMPERATURE	RELATIVE HUMIDITY
Surface	190 Deg 02 Knots			
1900	170 13	821 milibars	+5.0° C	48%
3900	180 26	767	+1.7	63
5900	200 32	715	-1.6	67
7900	200 37	662	-1.6	21
9900	210 40	609	-6.0	(Unknown but
11,900	210 44	560	-20.0	very low)

Weather following the shot

Surface winds at control point varied from calm to a maximum of 13

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[REDACTED]
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-Page 2-

DESCRIPTION OF SURFACE SHOT AND METEOROLOGICAL CONDITIONS (cont'd)
knots, all from the South and Southeast, from shot time (0900) until 2030 on shot day (Nov 19).

At 2130 the wind increased to 17 knots and continued to blow at 17 to 30 knots from the South until 1730 on 20 November.

Rain fell in the period 2130 Nov 19 to 0130 on Nov 20. The rainfall was sufficient to wet the soil in the shot area to a depth of $3/4$ ". Very little dust was picked up by the wind after the rain until the soil surface was dried out (about noon on Nov 20).

Surface zero elevation above mean sea level - 4100'.

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
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SUMMARY OF PRELIMINARY

JANGLE RESULTS

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Yield Surface Underground
 1.1 KT 17 feet
 1.1 KT

<u>Crater</u>		
Diameter	90 feet	350 feet
Depth	30 feet	100 feet
<u>Air Blast</u>		
25 psi	230 yds (300 yds for equivalent Air Burst)	125 yds
Ground Shock	Direct Ground Shock Small. Air Blast Induced Ground Shock Dominates.	Direct Ground Shock Greater Than Surface Shot. Air Blast Induced Ground Shock Still Important.
Missiles	No data but probably Small	Considerable Numbers out to 2000-3000 feet.
Thermal Radiation	One-third of Air Burst High in Infra-red	None
Cloud Height	11,000 Feet	7,000 Feet
Initial Gamma Radiation Dosage	One Half of Air Burst	Smaller
Total Dosage (400 r)	0.7 Mi2 (0.5 Mi2 for equivalent Air Burst)	

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The following tabulation describes the effects of the surface explosion on the materiel and equipment which was exposed in the various test positions.

The original copies of the detailed damage assessment forms are attached to Copy 1 of this report and can be used for more detailed reference to specific damage to individual items if desired.

The distinction of serviceable and unserviceable refers to whether or not the item was immediately combat serviceable after the explosion and gives an indication as to the loss of immediate effectiveness of a unit from the standpoint of equipment and materiel.

The code number shown in the tabulation refers to the code number assigned to the particular item in the detailed test plan (Tab II-A). This code number can be used to identify the particular item with the photographs showing the damage (Tab II-G).

It will be noted that numerous items which were displayed in the test were not reported upon. This is due to the fact that many of the items were completely demolished and others were buried in collapsed emplacements. To stay within the prescribed radiation tolerances, no attempt was made to recover those buried items.

Position No. 1 - 100 yards from Ground Zero

<u>Item</u>		<u>Description of Damage</u>
<u>Ordinance Items:</u>		
<u>Above Ground</u>	<u>Code No.</u>	
Truck 4-ton C&R (End-on)	(1K-1)	Moved 33 feet. Totally destroyed by blast. Completely mangled and burned. <u>Unserviceable.</u>
57 mm Recoilless Rifle	(1E-1)	Moved 100 feet. Sight, sight bracket and monopod severely damaged. <u>Unserviceable.</u>
Cal. 30 Heavy Machinegun (1B-1)		Moved 75 feet. Mount bent, water plugs out, sight bent, grips burned. <u>(Unserviceable).</u>
Cal. 30 Light Machinegun (1B-2)		Moved 30 feet. Mount leg bent. Elevating and traversing mechanism bent. <u>Unserviceable.</u>
Cal. 30 Rifle M1	(1D-9)	Moved 200 feet. Stock shattered. Trigger housing missing, barrel bent. <u>Unserviceable.</u>
<u>Below Ground</u>		
Cal. 30 Rifle M1		<u>Serviceable.</u>

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Position No. 1 - 100 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Engineer Items:</u>		
<u>Above Ground</u>		
Bailey Bridge, 20' span (side-on)	(1G-1)	Moved 15 feet. End ramp blown 30 yards. Footwalk handrail blown off, planking shattered and strewn over 100-yard square area. Metal parts twisted, transom bent 30°. <u>Unserviceable.</u>
4 Luminous Markers (wired to bridge)	(none)	Three undamaged, One Missing.
Lensatic Compass	(1A-2)	Moved 50 feet. Totally destroyed. <u>Unserviceable.</u>
<u>Below Ground</u>		
Lensatic Compass	(1A-1)	Covered in foxhole - not recovered.

Signal ItemsAbove Ground

Loading Coil C-114	(1F-2) (1F-4)	Lost - considered totally destroyed.
Field Telephone EE8	(1C-1)	Lost - considered totally destroyed.
Surface-layed Wire and cable W-110B, W-143, WDI-Spiral 4	(1F-6) (1F-12) (1F-14)	Lost - considered totally destroyed.
Field Wire and Cable on Stub Poles. W-110B, W-143, WDI-Spiral 4 on Stub poles	(1F-8) (1F-10)	Lost - considered totally destroyed.

Below Ground

Field Telephone EE8	(1F-1)	Lost in collapsed emplacement.
Field Wire and Cable W-110B, W-143, WDI-Spiral 4. Buried 6" deep.	(1F-9) (1F-15) (1F-11) (1F-13) (1F-7)	Undamaged - <u>Serviceable.</u>
2 Loading Coils C-114	(1F-3) (1F-5)	Buried in emplacements.

Chemical ItemsAbove Ground
Gas mask

(1D-10)

Totally destroyed by blast and heat. Unserviceable.Below Ground
Gas Mask

Lost - Buried in emplacement.

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Effects on Materiel and Equipment (cont'd)

Position No. 1 - 100 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Quartermaster Items:</u>		
<u>Above Ground</u>		
Tent, Shelter	(1D-11)	Missing - considered totally destroyed.
Trousers, HBT	(1D-7)	Missing - considered totally destroyed.
Jacket, HBT	(1D-6)	Missing - considered totally destroyed.
Steel Helmet w/liner	(1D-8)	Missing - considered totally destroyed.
2 - 5 gal. water cans	(1A-6) (1A-8)	Totally destroyed.
<u>Below Ground</u>		
Trousers, HBT	(1D-2)	Lost in collapsed emplacement.
Jacket, HBT	(1D-1)	Lost in collapsed emplacement.
Steel Helmet w/liner	(1D-3)	Lost in collapsed emplacement.
2 - 5 gal. water cans	(1A-5) (1A-7)	Lost in collapsed emplacement.

Position No. 2 - 200 yards from Ground Zero

Ordinance Items:Above Ground

✓ Truck $\frac{1}{2}$ -ton C&R (end-on)	(2K-1)	Moved 10 feet. Hood blown off, radiator pushed against fan. Grill bent, windshield torn off. Headlights broken, front seats bent 60° backwards. Frame twisted, spare tire torn off. <u>Unserviceable.</u>
75 mm Recoilless Rifle	(2E-1)	Moved 4 feet. Sight damaged, debris in mechanism. <u>Unserviceable.</u>
Cal .30 Heavy Machinegun	(2B-1)	Moved 8 feet. Cork assembly water plugs destroyed. Water chest missing. <u>Unserviceable.</u>
Cal .30 Light Machinegun	(2B-2)	Weapon <u>serviceable</u> after cleaning.
Cal .30 Rifle M-1	(2D-9)	Moved 6 feet. No significant damage. <u>Serviceable</u> after cleaning.
105 mm Howitzer	(2D-1)	Moved 5 feet. Upper right <u>serviceable</u> and eye rivet

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Effects on Materiel and Equipment (cont'd)

Item Position No. 2 - 200 yards from Ground Zero

Ordnance Items:

Above Ground

Description of Damage

105 mm Howitzer	(2L-1)	missing. Bottom flap-hinge bent and broken, flap broken. Upper left shield, shield and hinge broken. Left axle lock lever bent. Panoramic telescope case crushed. Longitudinal level broken on telescope mount. Azimuth micrometer knob and index missing on telescope. Sights foggy, tires scorched, paint scorched. <u>Unserviceable.</u>
Tank, M-24	(5I-1)	Moved one foot. Left fender blown back and crumpled, spare track links blown free on tank. Paint and rubber scorched. Left track binds and would not function. <u>Unserviceable.</u>

Below Ground

Cal.30 Rifle M-1	(2D-4)	No damage - <u>Serviceable</u> after cleaning.
Tank, M-4A3 (hull down)	(2I-1)	Paint blistered, periscope blown from assistant drivers hatch, turret will not traverse, sights foggy. <u>Unserviceable.</u>

Engineer Items:

Above Ground

Sniperscope	(2E-2)	Light source mount broken. Objective lens sand blasted. <u>Unserviceable.</u>
Double Apron Wire	(None)	Barbed wire blown from stakes, center stakes bent 60°. <u>Unserviceable.</u>
Lensatic Compass	(2A-2)	Lost

Below Ground

Lensatic Compass	(2A-1)	Lost.
------------------	--------	-------

Signal Items:

Above Ground

Loading Coil, C-114	(2F-2) (2F-4)	No damage.
Field Telephone EE8	(2C-1)	Moved 150 feet. Set torn apart and totally destroyed. <u>Unserviceable.</u>

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Effects on Materiel and Equipment (cont'd)

Position No. 2 - 200 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Signal Items:</u>		
<u>Above Ground</u>		
Surface-layed Wire and Cable, WD1, WL10-B, WL43, Spiral 4	(2F-6) (2F-12) (2F-14)	Moved 9 feet. Wire pulled loose from anchor point. No circuits useable. <u>Unserviceable.</u>
Field Wire and Cable on Stub Poles. WD1, WL10-B Spiral 4	(2F-8) (2F-10)	Moved 70 feet. Poles blown away. Circuits broken and unusable. <u>Unservice- able.</u>
Radio Set SCR 528 (installed in tank)	(none)	Final stage of transmitter would not load up. Antennae broken at base and blown 61 feet. <u>Unserviceable.</u>
<u>Below Ground</u>		
Field Telephone EE8	(2F-1)	No damage.
Field wire and Cable WD1, WL10B, WL43 Spiral 4 - Buried 6"	(2F-7) (2F-9) (2F-11) (2F-13) (2F-15)	No damage.
<u>Chemical Items:</u>		
<u>Above Ground</u>		
Gas Mask	(2D-10)	Moved 2 feet. Cannister dented. <u>Serviceable.</u>
<u>Below Ground</u>		
Gas Mask	(2D-5)	Buried in emplacement.
<u>Quartermaster Items:</u>		
<u>Above Ground</u>		
Tent, Shelter	(2D-11)	Moved 75 feet. Totally de- stroyed, partially scorched, badly ripped. <u>Unserviceable.</u>
Trousers, HBT	(2D-7)	Moved 6 feet. <u>Serviceable.</u>
Jacket, HBT	(2D-6)	Moved 7 feet. <u>Serviceable.</u>
Steel Helmet, w/liner	(2D-8)	Moved 5 feet. <u>Serviceable.</u>
2 - 5 gal. water cans	(2A-6) (2A-8)	Totally destroyed. <u>Unserviceable.</u>
<u>Below Ground</u>		
Trousers, HBT	(2D-2)	Lost in collapsed emplacement.

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Effects on Materiel and Equipment (cont'd)

Quartermaster Items:	Code No.	Description Damage
<u>Below Ground</u>		
Jacket, HBT	(2D-1)	Lost in collapsed emplacement.
Steel Helmet, w/liner	(2D-3)	Lost in collapsed emplacement.
2 - 5 gal. water cans	(2A-5) (2A-7)	Lost in collapsed emplacement.

Position No. 3 - 400 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Ordnance Items:</u>		
<u>Above Ground</u>		
✓ Truck $\frac{1}{2}$ -ton C&R	(3H-1)	Windshield broken. <u>Serviceable.</u>
✓ Truck 2 $\frac{1}{2}$ -ton Cargo	(3J-1)	Hood blown off. Windshield frame bent, glass broken, left hood side panel pushed in, tarpaulin torn, ribs broken side of bed bent in 45°, radiator pushed back slightly. <u>Unserviceable.</u>
57 mm Recoilless Rifle	(3E-1)	<u>Serviceable</u> after cleaning.
Cal .30 Heavy Machinegun	(3B-1)	<u>Serviceable</u> after cleaning.
Cal .30 Light Machinegun	(3B-2)	<u>Serviceable</u> after cleaning.
Tank, M-24	(6I-1)	Paint blistering, right fender pushed against track, antenna bent. <u>Serviceable.</u>
105 mm. Howitzer	(3I-1)	Paint and tires scorched. <u>Serviceable.</u>
Cal .30 rifle M-1	(3D-9)	Moved 4 feet. <u>Serviceable</u> after cleaning.
<u>Below Ground</u>		
Tank, M-46 (hull down)	(3I-1)	No damage. <u>Serviceable.</u>
Cal .30 Rifle, M-1	(3D-4)	<u>Serviceable</u> after cleaning.

Engineer Items:

Above Ground

4 Luminous markers	(None)	No damage.
Sniperscope	(C-2) [REDACTED]	Shrapnel blasting on objective lens light source. <u>Unserviceable.</u>

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Effects on Material and Equipment (cont'd)

Position No. 3 - 400 yards from Ground Zero

Engineer Items:

<u>Above Ground</u>	<u>Code No.</u>	<u>Description of Damage</u>
Bailey Bridge	(3G-1)	Moved 1/3 foot. End ramps pulled away from transom on side toward blast. Walkway blown out of place on side toward blast. <u>Serviceable with minor repair.</u>
Lensatic Compass	(3A-2)	Missing.
<u>Below Ground</u>		
Lensatic Compass	(3A-1)	Missing.

Signal Items:

Above Ground	No damage.
Below Ground	No damage.

Chemical Items:

<u>Above Ground</u>		
✓ Gas Mask	(3D-10)	Moved 10 feet. Cannister dented. <u>Serviceable.</u>
<u>Below Ground</u>		
✓ Gas Mask	(3D-5)	Buried in emplacement. <u>Serviceable.</u>

Quartermaster Items:

<u>Above Ground</u>		
Tent, shelter	(3D-11)	Moved 15 feet. Torn beyond repair. <u>Unserviceable.</u>
Trousers, HBT	(3D-7)	Moved 15 feet. <u>Serviceable.</u>
Jacket, HBT	(3D-6)	Moved 7 feet. <u>Serviceable.</u>
Steel Helmet w/liner	(3D-8)	Moved 25 feet. <u>Serviceable.</u>
2 - 5 gal. water cans	(3A-6) (3A-8)	No damage.
<u>Below Ground</u>		
Trousers, HBT	(3D-2)	No damage.
Jacket, HBT	(3D-1)	No damage.
Steel Helmet w/liner	(3D-3)	No damage.
2 - 5 gal. water cans	(3A-5) (3A-7)	No damage.

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Effects on Materiel and Equipment (cont'd)

Position No. 4 - 630 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Ordnance Items:</u>		
<u>Above Ground</u>		
✓ Truck $\frac{1}{2}$ -ton C&R	(4H-1)	No damage.
✓ Truck $2\frac{1}{2}$ -ton	(4J-1)	Moved $1\frac{1}{2}$ feet. Hood bowed up. Left windshield broken. Left door panel caved, glass broken. <u>Serviceable.</u>
75 mm Recoilless Rifle	(4E-1)	No damage.
Cal .30 Heavy Machinegun	(4B-1)	No damage.
Cal .30 Light Machinegun	(4B-2)	No damage.
Cal .30 Rifle M-1	(4D-9)	No damage.
<u>Below Ground</u>		
Cal .30 Rifle, M-1	(4D-4)	No damage.
<u>Engineering Items:</u>		No damage.
<u>Signal Items:</u>		No damage.
<u>Chemical Items:</u>		No damage.
<u>Quartermaster Items:</u>		No damage.

Position No. 5 - 800 yards from Ground Zero

No damage to any materiel or equipment. All items were immediately combat serviceable.

Position No. 6 - 1000 yards from Ground Zero

No damage to any materiel or equipment. All items were immediately combat serviceable.

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Effects on Emplacements - Surface Shot

In the following tabulation only that damage which was sufficient to result in causing the occupant to become a casualty was considered.

FH - 2-man Foxhole w/o cover

X - Damaged sufficient to cause injury to occupants

NA - No positions of this type in test

O - Negligible damage.

Type Position	Position Number	Distance (yds) from G.Z.	Revettted	Unrevettted
FW	1FH	95	X	X
MG Empl.	1B	100	X	NA
81 mm Empl.	1C	100	X	NA
RR Empl.	1E	115	X	NA
Sp. MG Empl.	1F	115	X	NA
OP	2A	200	X	NA
MG Empl.	2B	200	X	NA
81mm Empl.	2C	200	X	NA
2 man Foxhole with cover	2D	215	X	NA
RR Empl.	2E	215	O	NA
Sp. MG Empl.	2F	215	X	NA
FW	3FH	250	O	X
FH	3FH	280	X	O
FF	4FF	315	O	X
FW	5FH	345	O	X
FH	6FF	375	O	X
OP	3A	400	O	NA
MG Empl.	3B	400	O	NA
81mm Empl.	3C	400	O	NA
2 man Foxhole with cover	3D	415	O	NA
RR Empl.	3E	415	O	NA
Sp. MG Empl.	3F	415	O	NA
FH	7FH	445	O	X
FW	8FH	485	O	O
FW	9FF	515	O	X
FW	10FH	545	O	O
FH	11FH	580	O	O
OP	4A	635	O	NA
MG Empl.	4B	635	O	NA
81mm Empl.	4C	635	O	NA
2 man Foxhole with cover	4D	645	O	NA
RR Empl.	4E	645	O	NA
Sp. MG Empl.	4F	645	O	NA
FW	12FH	695	O	O
FW	13FH	735	O	X
FW	14FH	765	O	O

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Effects on Emplacements - Surface Shot (con't)

Type Position	Position Number	Distance (yds) from G.Z.	Revettted	Unrevettted
OP	5A	800	0	NA
MG Empl.	5B	800	0	NA
81mm Empl.	5C	800	0	NA
2 man Foxhole with cover	5D	815	0	NA
RR Empl.	5E	815	0	NA
Sp. MG Empl.	5F	815	0	NA
FF	15FH	850	0	0
FF	16FH	885	0	0
FF	17FH	955	0	0
FF	18FH	980	0	0
OP	6A	1000	0	NA
MG Empl.	6B	1000	0	NA
81mm Empl.	6C	1000	0	NA
2 man Foxhole with cover	6D	1015	0	NA
RR Empl.	6E	1015	0	NA
Sp. MG Empl.	6F	1015	0	NA
FH	19FH	1050	0	0

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Position 1 (100 Yards)



Before ↗
Unrevetted Two Man Fox Hole
After ↓



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Position 1 (100 Yards)



Before ↗
Atomic Trooper Kilroy.
After ↘

?

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Position 2 (200 Yards)



Two man Fox Hole with Cover Before
After ↓



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Position 3 (400 Yards)



81 mm Mortar Position Before
 After



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Position 3 (400 Yards)



Before /
57 mm Recoilless Rifle Emplacement
After ↓



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Position 5 (800 Yards)



2 1/2 Ton Truck Before

After



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Position 6 (1000 Yards)



Before ↗
1/4 Ton Truck
After ↘



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Position 6 (1000 Yards)



Before ↑
Heavy Machine Gun Displacement
After ↓



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~~SECRET~~
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Position 6 (1000 Yards)



Before ↑
Two man foxhole with cover. Note; Light blast effects.
After ↓



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FILM BADGE DATA

The method of preparation of the graph showing the gamma dose during the first six minutes on the surface and in field emplacements for "S" shot was as follows:

A total of 340 film packets (containing two pieces of film: Eastman #5302, range 20r to 1000r, and Eastman Double Coat, range 1000 to 10,000 r.) in National Bureau of Standard holders were exposed as shown on the "Layout of Film Badge" map. Of these, 279 or 82% were recovered. The films were developed and read by the Evans Signal Laboratory unit at the Test Site. The dose due to residual radiation from H / 6 minutes until the time the films were picked up was calculated and subtracted from the total dose.

Not
per
detected

The resulting data were plotted on semi-log paper, and the best smooth curve drawn through the points. The curve for emplacements represents the average of two-man foxholes end-on and side-on to zero point, machine gun emplacements, 81 mm mortar emplacements, two - man foxholes with cover, etc. as shown on the layout. It is believed that this approaches the situation and random orientation which would exist on the battlefield. From the tabulation showing the per cent protection afforded by the average emplacement vs. distance from zero point, (see below) it is seen that a man "well down" in an emplacement is 90% protected from initial gamma radiation, i.e., 90% of the radiation does not reach him.

DATA SHOWING PROTECTION AFFORDED
AGAINST INITIAL GAMMA RADIATION
BY THE AVERAGE FIELD EMPLACEMENT-"S" SHOT

Distance from Surface Zero in yards	Dose in r in open	(Average) Dose in r in Emplacement	Dose in Emplacement	% Protection
250	10,000	1,700	17	83
300	6,500	780	12	88
400	2,800	260	9	91
500	1,200	130	11	89
600	630	62	10	90
700	360	31	9	91
800	220	15	7	93

CONCLUSION: A man in an emplacement is on the average 90% protected from initial gamma radiation.

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FILM BADGE DATA

Protection afforded against initial gamma radiation by tanks in Operation Desert Rock II;

Four tanks, two of which were dug in, were exposed. This did not provide enough data to draw firm conclusions, but the film badge readings in the tanks indicated that a tank "dug in" gave more protection than the average emplacement. A tank "in the open" gave less protection than the average emplacement.

Distance (yards)	Dose During First Six Minutes (in roentgens)			
	In Open	In Average Emplacement	In Tank Dug in	Tank in Open
220	10,000	3,000	1,200	4,500
420	2,400	220	100	500

Machine gun emplacements, with and without cover:

Film was recovered from three machine gun emplacements with cover, and from four without cover. The emplacements with cover gave slightly more protection against initial gamma radiation, but the data was too limited and too erratic to draw a quantitative conclusion as to the added protection afforded by overhead cover.

Two-man foxholes with long axis perpendicular to a line from the position to zero point and with cover:

Data was available from three such emplacements at distances roughly 400 yards, 600 yards and 800 yards from zero point. On the basis of this limited amount of information, it was estimated that the covered foxholes gave 99% protection against 97% for the same emplacement without overhead cover.

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Dose in r

<u>Yards Distance</u>	<u>Dose; in open in r</u>	<u>Parallel Hole</u>	<u>% Pro- tection</u>	<u>Perpendicu- lar Hole</u>	<u>% Pro- tection</u>	<u>Difference in %</u>
250	10,000	800	92	390	96	4
300	6,500	580	91	270	96	5
400	2,800	310	89	130	95	6
500	1,200	160	87	60	95	7
600	630	85	87	29	95	8
700	360	45	88	14	96	8
800	220	23	90	7	97	7
900	130	12	91	3.2	97	6

The above data is for two man fox holes with no cover. A parallel hole is one whose long dimension is parallel to the line from zero point to the hole. A perpendicular hole has its long dimension perpendicular to this line.

The original film badge data and the calculations made in this study are on file in the Radiation Branch, Hq Armed Forces Special Weapons Project, P. O. Box 2610, Wash. 25, D. C.

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GAMMA RADIATION EFFECTS

DOSE RATE
H/1 HR

SURFACE AREA
(SQ MI)

UNDERGROUND
AREA (SQ MI)

50 r/hr
100 r/hr
300 r/hr
500 r/hr
1000 r/hr

1.8
1.1
0.14
(crater and lip area only)
(crater and lip area only)

very large
2.1
0.34
0.2
0.08

TOTAL DOSAGE

SURFACE AREA
(SQ MI)

100 r
200 r
400 r
1000 r
5000 r

1.6
0.9
0.7
0.4
0.15

DECAY FACTORS

To correct contamination
to times other than H/1
hour after detonation,
use the following factors:

Time After Detonation	Decay Factors
15 minutes	5.4
1 hour	1.0
5 hours	0.12
24 hours	0.02
1 week	0.002
1 month	0.004

INFORMATION

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DESERT ROCK - "S" SHOTRADIOACTIVE CONTAMINATION ON AND NEUTRON INDUCED RADIOACTIVITY
IN FOODS AND WATER

The following rations and water cans were recovered and examined on 24 November 1951:

<u>Item</u>	<u>PSN</u> <u>1</u>	<u>PSN</u> <u>2</u>	<u>PSN</u> <u>3</u>	<u>PSN</u> <u>4</u>	<u>PSN</u> <u>5</u>	<u>PSN</u> <u>6</u>
Canned rations; below ground "C" ration box			3A-3	4A-3	5A-3	6A-3
Canned rations (surface) "C" ration box		2A-4	3A-4	4A-4	5A-4	6A-4
Can, water 5 gal. below ground			3A-5	4A-5	5A-5	6A-5
Can, water 5 gal. surface		2A-6	3A-6	4A-6	5A-6	6A-6
Can, water 5 gal. Open on surface		2A-7	3A-7	4A-7	5A-7	6A-7
Can, water 5 gal. surface, open			3A-8	4A-8	5A-8	6A-8
Perishable rations, meat, beef (below ground, paper cover)	1A-9		3A-9		5A-9	
Perishable rations, meat, beef (above ground--bare meat exposed)	1A-10		3A-10		5A-10	
Perishable rations, salt (below ground in paper sack)			3A-11	4A-11	5A-11	6A-11
Perishable rations, salt (above ground in paper sack)		2A-12	3A-12	4A-12	5A-12	6A-12

First a survey check for radioactivity was made using a Beckman Beta-Gamma Survey Meter, Model MX-5. Reading were made one inch from the specimens with the beta shield open.

Any item that was contaminated or that showed induced radioactivity was turned over to the technical group from the Army Medical Center, Washington, D. C. at the test site for further examination in their counting laboratory.

Only one box of the recovered rations showed neutron induced radioactivity. This was exposed above ground at 200 yards (Item 2A-4). All of the other boxes were free from activity after the outer paper and cardboard box was removed.

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In item 2A-4 the metal cans and metal foils showed neutron induced activity. None of the foods except those listed below were radioactive:

Soluble Milk
Cocoa
Soluble Coffee
Salt Crackers

The activity was below tolerance level and not due to fission products. The food in this "C" ration box was edible when examined, i.e., five days after "S" Shot. This experience, though limited, agrees with the findings of Peterson, Webster and Liljigren; "Neutron Induced Radioactivity in Foods", to be published in the January 1951 issue of "Nucleonics". It appears correct to say that packaged food in an unbroken container is safe to eat after exposure to an atomic weapon detonation.

The salt exposed above ground at 200 yards and 400 yards was radioactive due to Na^{24} formed by neutron capture. On 24 November at about 2000 hours the following specific activities were observed:

200-yard sample - 21×10^{-6} millicuries/gram
400-yard sample - 1.5×10^{-6} millicuries/gram

It is felt that this level of activity could and should be tolerated under combat conditions.

The water in the can left open at 200 yards contained fission products. None of the water in closed cans contained radioactive material.

The meat exposed without a paper wrapping at 100 yds. was contaminated. It had weathered for five days and was somewhat dried out and spoiled. It was found that removing $3/4"$ of the outside layer of meat removed most, but not all, of the radioactive contamination. There was no neutron induced activity in the meat samples. This meat sample was too thin to make observations at a greater depth within the meat.

[REDACTED]

[REDACTED]

[REDACTED]

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EFFECTS OF RADIOACTIVE DUST

Fallout particles were obtained and examined by the Effects Tests Group of Operation JANGLE. All active particles obtained within a range of 10 miles from surface zero were of a diameter greater than 150 microns. This does not represent a respiratory hazard. Corollary measurements by the AEC were made in cities of northern Nevada, Utah and southern Idaho. Levels of activity detected were well below even rigid laboratory tolerances, and a preliminary particle size determination indicated that 80 to 95% were of less than 5 microns in diameter, well within the respiratory retention range.

These two situations can be explained by the fact that the particles which fell out close to ground zero were fused or partially fused material and of relatively large size. The particles of smaller size were carried longer distances but were so diluted in the atmosphere and so decayed with time that they did not represent a respiratory hazard even though the particles were small enough to be retained in the lungs.

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EFFECTS ON ANIMALS

Preliminary Account of Mortality and Total Dosage in Animals Exposed in Operation Jangle - Surface Shot

All of 15 dogs and 12 sheep (ewes) exposed at varying distances from S-0 (2500', 5000' and 8000') survived the test shot. The animals were disposed at the surface of the ground and in the fox-holes along arcs extending from a line 50° E of N to a line 25° E of N. The principal region of contamination fell outside of the animal array used during this test.

Each animal carried a Polaroid, Land dosimeter (FB-5d) but due to the activity of the animal and the faulty spring clips only 25% of the films were recovered. Of those recovered at 5000 and 8000 foot stations all showed dosages of less than 10r. Surface animals at 2500' stations were found to have received 230 to 340r while one fox-hole sheep was found to have received 23r. These measurements agree fairly closely with N.B.S. film dosimetry measurements both at the surface and in fox-hole stations.

Fox-hole animals were placed on the 45° E of N line, these being 2 sheep each at 2500 and 5000 foot positions while 2 dogs were placed at 2500 foot stations and one at 5000 feet from ground 0.

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SIXTH ARMY COMMANDER AND EXERCISE SUPERVISOR

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CAMP COMMANDER AND EXERCISE DIRECTOR

Brigadier General B.M. Fitch

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DEPUTY CAMP COMMANDER

Colonel Calvin A.L. Dickey

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S-3 Major Glenn A. Smith

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

MEMORANDUM

19 November 1951

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

<u>UNIT</u>	<u>HOME STATION</u>
Fd & Hq Btry III Corps Arty	Ft. Lewis
231st Engr C Bn	Ft Lewis
359th Engr Util Det	Cp Cooke
Det, 597th Lt Equip Co	Ft Huachuca
90th Engr Water Sup Co	Ft Lewis
Maint Plat, 705th Engr Fld Maint Co	Ft Huachuca
Hq & Hq Det 393d Ord Bn	Cp Cooke
161st Ord Depot Co (-)	Cp Cooke
3623d Ord Co (MT)	Cp Cooke
Det, Hq & Hq Co 303d Sig Svc Bn (1)	Cp Cooke
Det, Hq & Hq Co & Co "B," 314th Sig Svc Bn (-)	Cp Cooke
504th Sig Base Maint Co (Det)	Sacramento
Co "A" 505th MP Bn	Cp Roberts
Co "C" 505th MP Bn	Cp Roberts
621st QM Svc Co	Ft Lewis
1 Plat, 523d QM Sub Dep Co (-)	Utah Gen Depot
53d QM Base Depot Co (Det)	Utah Gen Depot
1 Plat, 539th QM Ldry Co	Ft Lewis
4th TC Trk Co	Cp Stoneman
2 Plat, 92d TC Car Co	Cp Roberts
806th APU	Ft Lewis
94th VFID	Ft Lewis
4 Sections, 562d Staging Area Co	Cp Stoneman
16 Food Service Personnel	Presidio of S Fran

BY COMMAND OF BRIGADIER GENERAL FITCH:

OFFICIAL:

HARRY P STORKE
Colonel, Arty
Chief of Staff

JAMES J CRAWLEY
Major, AGC
Adjutant

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Observers' Instruction Schedule

13 November 1951

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Date	Time	Subject	Instructor	Place
14 Nov	0900-0930	Introduction Desert Rock II	Major Jessup	Theater
	0930-1030	Basic Weapons	Commander Pollock	"
	1030-1200	Nuclear Physics	Major Senior	"
	1330-1430	Bomb Physics	Major Senior	"
	1430-1630	Bomb Effects	Commander Pollock	"
15 Nov	1330-1500	Weapons Description	Major Senior	"
	1500-1630	Bomb Effect	Commander Pollock	"
16 Nov	0900-1100	Medical Aspects of Atomic Disasters	Lt. Colonel McDonnell and Lt. Colonel Hartgering	"
	1330-1400	Security	Mr. Evans	"
	1400-1500	Operation Desert Rock I	Lt Colonel Brunsvoild	"
	1500-1600	Operation Desert Rock II	Lt Colonel Brunsvoild	"
17 Nov	0900-1000	Radiation and Radiation Measurements	Capt Gershater	"
	1000-1100	Instruments	Captain Rogers	"
	1100-1130	Radio logical Decontamination	Lt. Buddee	"
18 Nov	Sunday, (no school)			
19 Nov	0900-1000	Organization of Dept. Army for Radiological Defense	Major Servis	School tent
	1000-1130	Film (Individual Protection)	Lt. Chapman	Theater
	1330-1600	Seminar & Report by Observers' Committees	Officers of S-3 Section and Lt. Col. Brunsvoild	School Tent
20 Nov	0900-1000	Film (Tale of Two Cities)	Lt. Cannann	School Tent
	1000-1200	Effects of Desert Rock II, (if observers' trip to test impractical)	Major Gibson	Theater

FITCH
Brie, Gen

14 November 1951

Observer Instruction Schedule

Date	Time	Subject	Instructor	Place
17 Nov 51 Saturday	0900-1000	Organization of Tent of the Army for Radio- logical Defense	Major Servis	School tent
	1000-1100	Radiation and Radia- tion Measurements	Captain Pershat r	School tent
	1100-1130	Radiological Decon- tamination	Lt Dudgee	School tent
	1330-1500	Naval Delivery and "The Bomb at Sea"	Comdr Hollock	School tent
	1500-1600	Radiac Instruments	Captain Lemsey	School tent

WITCH
Friedman

OFFICIAL:

WITCH
S-3

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HEADQUARTERS
Camp Desert Rock, Las Vegas, Nevada

15 November 1951

MEMORANDUM:

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SUBJECT: Seminars

TO: Observer Personnel at Co Desert Rock Exercise II

1. On Saturday afternoon, 17 November and thereafter as directed, seminars will be conducted, during which your impressions concerning the Nevada atomic test; and your conclusions and recommendations resulting therefrom, will be presented to the class.

2. You are being divided into Discussion groups by branch of service. These groups will be headed by group leaders, who will present during the 1330-1600 period, 17 November, findings and recommendations or ideas of the group. These findings will be in writing. They need not be confined to majority opinions of the group; views and ideas of individuals are also desired. Saturday morning will be devoted to discussions by groups and preparation of reports. However, it is hoped that there will be discussions and formulations of views on this important subject during your free time.

3. Our reason for these seminars is that many of you are connected with various service schools throughout the Army and in that capacity have worked with the tactical as well as the strategic doctrines of your various branches. From these positions which you occupy either as service school instructors, or in such other positions as you may be filling, you have probably had or will have, opportunities to view objectively the test which we are conducting here at Desert Rock. Each of you here will observe this test from a specific point of view, your own or that of your branch, and will have ideas along the lines in which you have been trained. It is desired to record and forward these ideas to higher headquarters for their consideration and use.

4. In preparing your papers for the seminar conclusions or recommendations as regards the following points are desired insofar as practicable:

a. From the point of view of your branch of service, what conclusions or recommendations may be drawn by the use of the atomic weapons in:

- (1) Design of equipment.
- (2) Availability and use of specialized equipment in forward areas.
- (3) Disposition, handling and transportation of equipment in forward areas.
- (4) Specialized training to cope with enemy atomic attacks.

b. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

- (1) Disposition of troops in rear areas.
- (2) Disposition of troops in the attack.
- (3) Disposition and use of troops in the defense.
- (4) Availability and use of special technical personnel or troops in forward areas.

(5) Training and ~~disposition of troops.~~

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c. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I and II, what is your estimate of the missions best suited to Department of the Army in future tests, with regard to both troop training and further experimentation of any military nature?

18 November 1951

SEMINAR - The Atomic Bomb - As it Affects the Combat Arms and Tech Services.

Gentlemen: (Lt Col Brunsvold)

The plan for this afternoon is as follows: I will call on each of the group leaders who prepared reports this morning to come up to the front of the room and go through the report of that group. The purpose of this is to take advantage of the recommendations and thoughts of each of these groups. Following the presentation by each of the group leaders, we will invite comments or questions from the remainder of the class. In order to control the meeting, if you have a comment or question, raise your hand and we will call on you. If you have a long comment to make, we will run the microphone down so that the stenographers can take down your remark. Following are a number of things in particular that I want to bring up.

We don't have time this afternoon to hold as a part of the Seminar a comment on the training program which you have just been subjected to, and how it can be improved. We will appreciate suggestions prior to your departure from Camp. If you have ideas or suggestions which would improve the next class (for the next shot), it will make their program better, particularly from the standpoint of material presented, and whether you think the material was duplicated in too many talks. In order to limit the time this afternoon, we will not go into that part of it. General Fitch in the last day or two received a directive from Army Field Forces in which specific questions about atomic weapons and doctrines were asked. These questions are to be used by Field Forces as a part of basis for symposium which will be held there in January. We feel that the comments from you people today will be helpful in preparing the replies to those questions. I want to express my own personal appreciation for the kindness you have shown to all of us during this instruction program.

I feel that the personnel under General Fitch and Major Smith have done a good job in arranging a training program in the short time they had. I think later it is planned to put in better facilities when time permits.

After each group leader has discussed his paper, we would like for him to leave his paper with the stenographers so that we can have it typed. Without regard to seniority of the person reporting, I propose to call on the group leaders of Combat Arms group first, followed by the group leaders of the Technical Service

One point that I think will be of interest--the weather looks favorable for tomorrow.

I will now call on Lt. Col. Drouillard.

GROUP I - INFANTRY

1. A discussion was held by members of Infantry Group #1 for the purpose of answering questions outlined in par 1a and b, Memorandum, Subject: Seminar, Hqs, Camp Desert Rock, dated 15 Nov 51.

2. Discussions of the various subjects were limited in that only two of the officers attended the courses offered at Sandia, and only one officer had observed Operation BUSTER.

3. Conclusions and recommendations of the group are outlined below:

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a. From the point of view of your branch of service, what conclusions or recommendations may be drawn by the use of the atomic weapons in:

(1) Design of equipment.

(a) Issue of the reversible parka (white and OD) for reflection of thermal radiation

(b) Use of white underclothing.

(c) Plastic boot covers for passing through contaminated areas.

(2) Availability and use of specialized equipment in forward areas.

(a) In favor of self-reading dosimeters - 3 Officers

(b) Not in favor - 23 Officers

(3) Disposition, handling and transportation of equipment in forward areas.

(a) No change in disposition, handling, and transportation of equipment in forward areas.

(4) Specialized training to cope with enemy atomic attacks.

(a) No special training to cope with atomic attacks. Re-emphasis of present infantry doctrine.

b. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

(1) Disposition of troops in the attack.

(a) No change for troops in the attack. Troops should be taught to close with the enemy as soon as possible. In the attack and defense, corps to have sufficient reserves to plug the gap caused by enemy atom bombs.

(2) Disposition of troops in rear areas.

(a) Additional dispersion for such reserves above battalion level. No change for battalion-size and small units. Mobile reserves to be "dug in" in assembly areas.

(3) Disposition and use of troops in the defense.

(a) No major changes in defensive doctrine. Command posts, supply points, and other installations should be "dug in".

(4) Availability and use of special technical personnel or troops in forward areas.

(a) No special technical personnel needed in forward areas. Gas officers and NCO's to be trained for CBR work.

(5) Training and indoctrination of troops.

(a) The following breakdown of hours recommended for the indoctrination of troops during their basic training was suggested:

1. 1st hour - Characteristics and methods of delivery of atomic bombs.

2. 2nd hour - Effects and limitations of atomic bombs.

3. 3rd hour - Individual protective measures.

4. 4th hour - Summary and open discussion.

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(b) Above subjects are to be re-emphasized during concurrent training. Poll of hours deemed necessary for indoctrination resulted in the following: two hours, three officers; four hours, seventeen officers; eight hours, one officer; twenty hours, one officer. Publication of pamphlet by D/A entitled: "Individual Actions in Atomic Warfare" prepared by the Infantry School, is slated for this month.

c. As a result of knowledge gained or of reports, you have heard about Operations Desert Rock I and II. What is your estimate of the missions best suited to Department of the Army in future tests with regard to both troop training and further experimentation for any military nature?

(1) Future tests should incorporate the following:

(a) More time be devoted to detailed planning prior to future tests to include participation by representatives of the service schools and chief of services to insure that every possible measure is included to obtain answers to all questions that may affect doctrine.

(b) The employment of larger amounts of equipment and materiel in future tests to gain more detailed and accurate information.

(c) If the results of the one KT surface and sub-surface bursts indicate that a nominal bomb may be employed in such tests with safety, recommend that a full scale test be conducted.

(d) Future tests to be conducted on a different type terrain. Use sheared sheep dressed in fatigues, at various ranges, on the ground, in fox holes, and in vehicles.

Lt. Col. Brunsvold:

We have another group from the infantry to report--Col. Linder:

GROUP II - INFANTRY

1. From the point of view of your branch of service, what conclusions or recommendations may be drawn by the use of the atomic weapons in:

a. Design of equipment.

(1) No major changes of design of equipment used by the Infantry.

(2) Since the fox hole is the soldier's best friend on the battle field, a redesigned individual entrenching tool of light weight, designed for ease of carrying, and which will give maximum service for digging under various conditions is in order.

(3) To further expand the "digging-in" capabilities of infantry unit especially for such items as vehicles, CP's, maintenance installations, P&A installations, etc, a light-weight bulldozer or other ditch digging apparatus for each infantry division is recommended. This equipment to be assigned to service company of an Infantry regiment for use by battalions or to be used by the regiment under regimental control.

(4) An alternate to paragraph (3) above might be to design a blade to be attached to a jeep or 2½-ton truck that would be an assist of each vehicle operator to quickly dig in his own vehicle.

(5) This next item infringes on the medical field, but is of great concern to the infantry soldier. Since burns of all intensity and nature are a casualty producing agent of the A-bomb, it is recommended that the first aid packs carried by the individual contain a medicant of some type to be applied to burns.

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b. Availability and use of specialized equipment in forward areas.

(1) This subject and the subject of redesign of equipment are pretty closely associated.

(2) Recommend that each individual be required to have on his person a dosimeter of some type as determined by tests now underway.

value
(3) Recommend that the CBR officers and non-commissioned officers in each unit, down to and including company, be thoroughly trained in and equipped with ~~radar~~ equipment in order that the intensity of any given area at any given time be known by the unit commander.

(4) No other specialized equipment in forward areas was considered.

c. Disposition, handling, and transportation of equipment in forward areas.

(1) No special problem since we do not recommend any major changes or additions in equipment to cope with atomic bomb use.

d. Specialized training to cope with enemy atomic attacks.

(1) Recommend that CBR officers and non-commissioned officers, as well as alternates, be thoroughly trained in effects of atomic attack, defense against atomic attack, and use of radar equipment. They must be the unit experts.

(2) Recommend that the cloak of secrecy and mystery be thrown off the A-bomb and its effects, and a program of thorough indoctrination and education be presented to all military personnel. This program should not be a one-time affair, but a program to be repeated at regular intervals so that the most unintelligent individuals in the military service understand all the implications of the bomb and effects of radiological warfare.

(3) These next items are not specialized training as we think of the term, but in light of our weakness in their application, it is felt that the following be stressed continually in all training. These items are camouflage, concealment and dispersion. Due to our air superiority in World War II and Korea, our Army is extremely lax in their application.

(4) A minority report rendered by a member of the group was to stress training in defense on a wide front or defense. Types of defense, methods of organizing for defense, and acts of defense are presently under study in light of what we have learned in World War II and Korea as well as what we know of the destructive power of the A-bomb. However, it was concluded by the group that the type of defense adopted by a commander depends on certain conditions that are ever present in warfare. Some of those are the terrain, composition and strength of enemy force in front of you, the means available to you to conduct the defense, and the sector assigned to you to defend.

2. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

a. Disposition of troops in rear areas.

(1) Tactical troops (reserves) must be well camouflaged, concealed and dispersed. It was recommended that our reserves be located about a mile apart of a size not to exceed a battalion. Another point, our reserves must be highly mobile and capable of moving to the point where they are most needed very quickly and in condition to carry out a mission effectively.

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(2) Service troops and installations

(a) The points to keep in mind about location of service installations are ability to perform mission of support to combat units, defensibility, and dispersion. So with too great a dispersion of installations, you may be sacrificing defensibility and ability to perform the mission. Conversely, if you concentrate for defensibility, you may sacrifice dispersion. So a happy medium must be adopted in light of the affects of the A-bomb, but with the mission of service units always paramount in your mind.

(b) A splitting of service installations to two or more separate locations may be feasible in some instances. This would reduce the possibility of losing all of one type supply at one location.

(c) Another recommendation is to dump less supplies on the ground, keep as much as possible on transportation where it can be quickly moved. This ties in pretty well with the recommendation of splitting classes of supplies and locating these supplies at two or more places.

b. Disposition of troops in the attack.

(1) On attack we still need mass and economy of force. The threat of attack by atomic bomb comes when we mass our forces for periods long enough for the enemy to profitably use an atomic bomb or projectile on our area of concentration.

(2) So we must mass our forces quickly and secretly and plan our attack so that we spend the absolute minimum of time in a concentrated area before we strike a hard decisive blow and close with the enemy. Surprise is the key note, not only from the viewpoint of striking where the enemy does not expect you to strike but also to strike quickly and with all the power you can muster to gain a decisive advantage.

c. Disposition and use of troops in the defense.

(1) No minor changes in our present defense doctrine.

(2) Recommend that foxholes be revetted and provided with overhead cover from materials available in the area.

(3) Type of defense depends on mission assigned, terrain to be defended, means available to conduct defense, and capabilities and composition of enemy forces expected to attack you.

(4) Recommend that study be given to position defense and wide front or mobile defense in light of effects of A-bomb versus ability to accomplish our mission against other forms of enemy attack. We must come up with best means of defense against all forms of attack.

d. Availability and use of special technical personnel or troops in forward areas.

(1) Forward areas is interpreted to mean forward of division rear boundary.

(2) The present organization of CBR personnel with ^{radio} ~~same~~ equipment seems to be adequate.

(3) No special technical personnel or troops in forward areas are felt to be needed.

e. Training and indoctrination of troops.

(1) Recommend all military personnel be given the straight facts in an intelligent and logical manner regarding ~~effects of~~ ^{effects of} and protective measures against an A-bomb.

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(2) This program to be not a one-time affair but a program wherein indoctrination is repeated at intervals so that everyone understands all implications of atomic warfare.

3. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I and II, what is your estimate of the missions best suited to Department of the Army in future tests, with regard to both troop training and further experimentation of any military nature?

a. General - The Army should first conduct studies and definitely decide what test or tests will give them the information to answer the majority of questions still unanswered. Then build up a case of definite need for a bomb or number of bombs to be used for Army or military experimentation and present it to the AEC. Then with AEC acting as the bomb supplier and supervisor of all the technical aspects of firing the bomb, the Army will lay out the test area, after careful planning, to come up with some definite results of what the bomb will do to a defensive position, a division in attack, logistical installations (perhaps an Army service area), etc.

b. Experimentation

(1) Lay out a division defensive position, make a target analysis of the point to drop the bomb, put in dosimeters, animals, etc, and get some results.

(2) Lay out a division in attack under same conditions as (1) above.

(3) Do the same for an Army Service Area.

c. Training.

(1) Intensify indoctrination of all military personnel regarding effects of A-bomb as well as defense against effects of A-bomb.

(2) Train CBR personnel for each unit from company size and up.

4. What general and specific policies and procedures should the Department of the Army adopt now in order to accomplish practically and expeditiously proper indoctrination and training of Army troops with respect to atomic warfare?

a. Dissemination of information as acquired without delay.

b. Distribute a uniform plan of orientation and information to be disseminated to troops. Might go to the point of distributing lesson plans.

c. A review of information now known with the view of down grading as much general information as possible for orientation of all military personnel.

d. Build up a library of training aids and training films to accompany detailed orientation courses.

e. Increase emphasis in training on camouflage, dispersion, fortification etc. in all training.

5. Here at Desert Rock:

a. Issue a loose-leaf folder presenting entire plan of subjects to be presented. Allow students to take notes on lecture to fill in outline plan as desired. Collect folders at end of classes, secure and reissue each time class re-assembles. Upon completion of course, mail classified folder to officers at home station.

b. Include Navy and Air Force personnel for better discussion in our Seminars.

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GROUP III - ARTILLERY -- Presented by Col Cole

1. Future design of Artillery equipment with viewpoint of defense against atomic warfare.

a. Protection against atomic weapons. Our present equipment is rugged enough (with the possible exception of sighting and instrument equipment which may require a design of a more rugged nature).

b. Fireproof all equipment to the extent practicable.

2. Necessity and use of specialized Artillery equipment in forward areas.

a. It is considered that bulldozers of better quality than now provided (for example, Marine Corps type) should be provided in sufficient quantity for all forward position areas. (In this connection it should be noted that a re-examination of the doctrine of digging in may be warranted, in light of the effects of surface and sub-surface bursts).

b. Timbers, or means of providing them, should be available to all artillery installations in the forward area at the earliest practicable time.

3. Disposition, handling and transportation of equipment in the forward area.

a. Without prejudice to the accomplishment of the mission, the deployment of the battery should not be over-extended beyond the present doctrine of dispersion; but maximum dispersion of battalions and higher groups should be effected.

b. As protection against blast effect, lashing of equipment on vehicles should be practiced.

4. Specialized training to cope with enemy atomic attack.

a. It is considered that the present training program including sending of selected individuals to CER schools and utilizing appropriate AFF lesson plans, is adequate. Further, that the large scale maneuvers providing for realistic training including reorganization after assumed catastrophic losses, is particularly valuable. Finally, measure should be continued to guard against becoming defensive minded (Maginot Line complex) (Foxhole bound).

5. Disposition of Artillery troops.

a. Rear Area. Generally speaking, artillery troops are not found in rear areas, however, where located in the rear, they should be "dug-in" as much as practicable.

b. Offense and Defense. The principle enunciated in paragraph 3a above with regard to disposition of artillery units is considered equally applicable to the disposition of troops in the offense and defense. Further, in the event that mass building tactics are employed by our infantry prior to the attack, it is considered, insofar as accomplishment of the artillery mission will permit, that medium and heavy artillery positions will avoid the critical building areas. (Note: There is some opposition in the group to this last statement).

6. Necessity and use of special technical personnel or troops in forward areas.

a. No special requirements for the artillery.

7. Training in the indoctrination of troops in atomic warfare.

a. The number of hours (10) now devoted to atomic training and indoctrination of troops is considered to be a minimum. In order to avoid increasing the length of ATP's or to avoid detracting from any other phase of troops is recommended.

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8. Recommendations with regard to future exercises.

a. There exists certain Army training and indoctrination requirements for atomic weapons. These requirements should be satisfied by the AEC, insofar as supply of weapons will permit. Inter-service participation should be encouraged in these exercises.

b. Future exercises, such as Desert Rock, should permit fuller scope of desired Army participation.

c. Future exercises should be covered by definite D/A directives which would guide the exercise commander in execution of his task.

d. Future exercises, such as Desert Rock, should approach the training objective of placing troops in tactical deployment similar to actual offensive deployment with this weapon; the foregoing within the framework of safety requirements.

e. In the event inconclusive evidence exists as to the effect of the atomic weapon in wooded terrain, tests in wooded terrain should be conducted.

f. Consideration should be given to AFF Boards participation in the development and testing of new weapons.

g. In order to permit greater freedom of action at Desert Rock, appropriate education should be initiated insofar as neighboring civilian communities are concerned.

9. Department of the Army policies:

a. In order to properly indoctrinate and train Army troops appropriate directives should be issued to implement the above recommendations.

10. General

a. No attempt has been made to cover atomic weapons which the Army is developing.

GROUP IV - ARTILLERY

Presented by Col. Otto, Army War College, Carlisle Barracks.

1. Future design of Artillery equipment with viewpoint of defense against atomic warfare.

a. Consideration should be given to the design of protective shielding for anti-aircraft weapons to protect the crews against the effects of atomic explosion, particularly the thermal effect.

b. Camouflage nets, tarpaulins and sand bags should be made of a fire-proof material.

c. The Army should accelerate its development of an accurate surface to surface artillery guided missiles for the delivery of an atomic war-head.

d. Recommend that research be continued to develop artillery atomic projectiles that make use of the implosion principle with emphasis on increasing efficiency and reducing caliber.

2. Necessity and use of specialized artillery equipment in forward areas.

a. Monitoring equipment should be furnished down to battery level as now contemplated by the Chemical Corps plan. Cumulative type dosimeters should be issued to all individuals. Pending development of a standard dosimeter, individual film badges should be issued to forward troops.

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3. Disposition, handling, and transportation of equipment in the forward area.
 - a. None.
4. Specialized training to cope with enemy atomic attack.
 - a. None.
5. Disposition of artillery troops.
 - a. It will require a greater number of anti-aircraft units to defend a wider area of dispersion of service units and supply points.
 - b. Artillery should conform to the Infantry's disposition.
 - c. Artillery should have the responsibility for preparing the atomic shell for firing after the delivery of the nuclear component. The Ordnance should render technical advice and assistance only.
 - d. Special deception units should be made available for use in areas where the 280 MM gun is to be used for the specific mission of erecting dummy positions. Additional anti-aircraft units, both Gun and AW, must be provided to protect the very heavy artillery.
6. Recommendations with regard to future exercises.
 - a. Quotas for combat arms should be increased for the C and E Course at Sandia Base.
 - b. More emphasis should be placed on the rapid installation of overhead cover on field fortifications and installations, both hasty and deliberate.
 - c. The Army should actively participate in all future atomic tests.
 - d. Tests of equipment should be as recommended by the Army Field Forces Boards.
 - e. Participation of troops should be coordinated by Army Field Forces.
 - f. The Army should press for an atomic test explosion on a division tactical position that has been fully occupied, leaving token items of equipment in position with adequate means of testing effects on all personnel. This might be accomplished in conjunction with a field maneuver. Should be held on other terrain possibly in West Texas.
7. General.
 - a. Down-to-earth, understandable information on the casualty capabilities and effects of atomic explosions should be distributed for the information of troops. This material should be in the form of illustrated pamphlets, training films, entertaining lectures and TIE programs and materials of all kinds.
 - b. Results of Desert Rock and future atomic tests that confirm or modify information that has already been disseminated should be distributed at the conclusion of the exercises.
 - c. Any agency conducting instructions of selected individuals in atomic warfare should issue a written summary of information, under the highest classification, that can be disseminated to troops by these individuals on their return to some stations.
 - d. Doctrine on the tactical employment of atomic weapons by the Army should be developed as a matter of urgency.
 - e. Observers attending any atomic test should be given a short indoctrination course on the site along the lines of that given at Desert Rock II.

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f. At least one large maneuver or field exercise per year should stress the tactical use of the atomic bomb, and a simple method of simulating an atomic explosion should be sought.

GROUP V - ARMORED

Presented by Lt. Col. Green, Office of Chief of Psychological Warfare
Washington, D.C.

1. General:

- a. Not now a tactical weapon.
- b. Has merely introduced a new hazard.

2. From point of view of my branch of service, the following recommendations may be drawn by use of atomic weapons in:

- a. Design of equipment - no specific changes deemed necessary at this time.
- b. Availability and use of specialized equipment in forward areas - none necessary.
- c. Disposition, handling and transportation of equipment in forward areas - no change.
- d. Specialized training to cope with enemy atomic attacks - not considered necessary.

(1) Fox holes sufficient.

3. Tactical Aspects.

- a. Disposition of troops in rear areas - no change.
- b. Disposition of troops in attack - no change.
- c. Disposition and use of troops in the defense - none necessary, armor must maintain mobility.
- d. Availability and use of special technical personnel or troops in forward areas:
 - (1) Plan as presented appears adequate.
 - (2) Down to Bn level at least.
 - (3) CBR NCO in companies.
- e. Training and indoctrination of troops training circulars or similar regulations reference what can or cannot be divulged to troops.

4. Future tests:

- a. Greater freedom for Army in these tests.
- b. Representatives of combat arms boards on test site.
- c. More troop participation - i.e., use of personnel in target area.
- d. More initiative from AEC.

5. Indoctrination and Training of Troops.

- a. Get information to [REDACTED]

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- b. Specialized instructional teams on the bomb and atomic warfare to visit all units for basic indoctrination.
- c. Compile basic lesson plan with list of available training aids.
- d. Clearly establish the hazard of the weapon as such - prepare for psychological impact.

GROUP VI - SIGNAL
Presented by Lt. Col. Keyncamp

1. This discussion was held and the conclusion reached before the group witnessed the explosion of the atomic bomb. Thus the effects of the bomb had not been witnessed personally by the group prior to the discussions.

2. Based on the indoctrination course received at Exercise Desert Rock II, the following conclusions were reached in regard to the discussion subjects presented.

- a. No general redesign of Signal Corps equipment is necessary at this time inasmuch as present trends satisfy the requirements of atomic warfare. These trends in design are for more rugged and durable equipment with less weight and volume.

- b. No specialized Signal Corps equipment is necessary as a result of the use of atomic weapons other than that already contemplated.

- c. Disposition, handling and transportation of equipment in the forward areas. This committee defined forward areas as the area forward of Division Hq. Adequate dispersion is required and "dug-in" installations are desirable.

- d. No specialized training is necessary for Signal Corps troops.

- e. With regard to disposition of troops in the rear areas, the present Signal Corps doctrine of "alternate route", "alternate means" and dispersal of installations is adequate. The use of underground installations and earthquake-proof buildings for large rear area communications installations should be emphasized.

- f. Complete and thorough indoctrinations of troops is required. This should include exactly what to expect of an atomic attack and what defense measures can be taken. It should be carried out by the unit making use of unit CBR personnel and should be accomplished as soon as possible. This orientation should be given periodically and should be revised in the light of new information and developments.

4. As a result of our orientation in Desert Rock I and II, this committee recommends the following missions for the chief signal officer in future tests:

- a. Develop a definite program for increased attendance of signal officer and enlisted personnel with the object of more complete indoctrination.

- b. The chief signal officer should make a comprehensive study to determine the effects of atomic warfare on signal equipment, procedures and doctrine.

- c. The Department of the Army should publish a standard training program with the view of accomplishing complete and uniform indoctrination of all personnel. This should be similar to the DA TC #12 which covered the training in the Uniform Code of Military Justice.

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d. The AG officers in this committee recommended that one of the existing personnel records should be expanded to include atomic exposure data.

GROUP VII- CHEMICAL

Presented by Lt Col Allen Williams, Chemical Corps, 3rd Army Hq.

1. Instruction.

a. It is recommended that a mandatory Army-wide course of simple and practical indoctrination, not to exceed 4 hours, in Rad-defense be set up for all troops, with integrated or refresher training whenever possible.

b. That this instruction be mandatory for all personnel and that refresher training be not less than one hour per month.

c. That an examination be held at the completion of the course and that entry be made on Officers' 66-1 and EM's forms 20 to the effect that they have completed the course of Rad training. (At present, no record is kept).

d. That Division and Regimental CBR personnel be required to attend the six-weeks course of instruction at the Army Chemical School at Ft. McClellan.

e. That every effort be made to stabilize trained Rad defense personnel in units, particularly in Division and higher echelons of command.

f. That the definite responsibility of Medical, Signal and Chemical Corps be outlined in appendices to SOP annex for Rad defense in order that all will understand and coordinate their responsibility.

2. Equipment. That inquiry and research be made in the design of chemical protective equipment against heat.

3. Depots. In service areas, that multiple service depots be set up in sections and widely dispersed.

4. Tactics.

a. Investigate the effects and advantages of smoke screens for possible protection against an atomic bomb attack.

b. That a minimum military tolerance against Rad be established and published.

5. Camp. Suggestions for Future Exercises. Facilities and treatment accorded have been excellent.

6. Course of Instruction.

a. Recommend that for future groups attending Desert Rock or a similar exercise that a predetermined course of instruction be set up for a definite period (whether the bomb is set off or not) with no overlapping.

b. That printed instructional material be made available for students to take back to their units, covering new doctrine and lessons learned for dissemination to their personnel.

7. Tests. That separation of AEC and military tests be made, and that military tests be conducted under simulated combat conditions.

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GROUP VIII (QM, OFD, TC, and MP)
Presented by Lt Col Martin, Post & Service QM, Camp Breckenridge, Kentucky

1. Recommend that the first period be devoted to a discussion of the course objective to include an explanation of what use may be made of the information, i.e., what information may be disseminated to troops and what information should be confined to staff level.
2. Recommend that hand-out material be provided members of the class, of the pertinent information contained in lectures to the group. This information should contain both classified and un-classified information which could be used by the observers for orientation of selected personnel at their home stations.
3. Recommend that a critique with all instructors, who have lectured to the group, be present to answer any final questions that are asked by the visiting officers.
4. Recommend that future tests include gasoline storage, both open and closed.
5. Recommend that future tests include a study of supply installations of all types, to determine particularly the requirements for dispersion, extent of contamination of supplies, and for underground storage.
6. Recommend that Service Installations be assigned trained monitors whose duties will be to locate and identify contaminated areas.
7. Recommend that Ordnance equipment tested be in a more normal condition of combat readiness, to include some vehicles with motors running, some with complete combat loads, and some tanks with hatches open.
8. Recommend that all types of ammunition be tested for sympathetic detonation.
9. Recommend that interpolated results of this blast be furnished direct to each participant when the results have been compiled.
10. Recommend that III Corps issue written guidance to observers as to what categories of information disseminated at Exercise Desert Rock can be officially disseminated by observers.
 - a. To troops.
 - b. To properly cleared students in Service Schools.
 - c. To properly cleared personnel of observers own Headquarters.
11. Recommend that III Corps initiate recommendations to D/A through 6th Army with a view to enlisting the support of higher authority in obtaining for the Army a greater degree of cooperation from AEC in testing Army equipment in future tests of atomic weapons.
12. Recommend that III Corps improve instructional facilities at Desert Rock so that training aids, films and film strips now available, may be utilized in future exercises.
13. Recommend that observers be permitted to take notes for use in reviewing and memorizing classroom instructions while at Camp Desert Rock. Notes to be turned in for destruction prior to leaving Camp Desert Rock.

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GROUP IX - MEDICAL

Presented by Col Charles B. Henry, MC, Medical Section, Office, Chief
Army Field Forces

1. Casualty evacuation is the major problem for the medical service.
 - a. Perimeter control. The immediate moving in of intact medical units.
 - b. Flexible medical field service in the utilization of field installations.
 - c. Decentralization of supply.
2. Types of Casualties.
 - a. Blast injuries and fractures present a quantitative factor only.
 - b. Burns. Open air treatment of burns applies more to the care of civilian population, military medicine requires present methods of the use of massive dry dressings.
 - c. Conservation of manpower primary factor. Dosimeters not of value to battalion aid station surgeon. Must depend in combat area on clinical evaluation.
3. Training and Indoctrination.
 - a. Medical effects well covered in our schools with present facilities.
4. Conclusions and Recommendations:
 - a. Additional emphasis be placed on the handling of mass casualties.
 - b. Maximum utilization be made of returning air transportation for evacuation of casualties to relieve congestion of field medical installations.
 - c. More emphasis be placed on the forward sorting of casualties in order that unnecessary loss of manpower be avoided.
 - d. Disposition of medical troops depends upon the tactical disposition of the troops which they support, either in the rear areas during the attack or in the defense.
 - e. There is no training, other than medical training required in the care of atomic casualties.
5. As a result of knowledge gained in participation in this exercise, it is suggested that:
 - a. Indoctrination training of all military personnel be mandatory in the present concept in the use of atomic weapons.
 - b. Department of Army be given more latitude in troop training and further experimentation.

GROUP X - ENGINEER

Presented by Lt Col Holmstrom

1. The following recommendations are made in accordance with memorandum subject "Seminars Hq Camp Desert Rock, Las Vegas, Nevada," dated 15 Nov 1951. The points listed in paragraph 4 of the above memorandum were used as guide for discussions

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- a. Recommendations drawn by the use of the atomic weapons in:
 - (1) Design of equipment:
 - (a) No change.
 - (2) Availability and use of specialized equipment in forward areas.
 - (a) Greater need for replacement.
 - (b) Place water tanks underground.
- b. Disposition, handling and transportation of equipment in forward positions.
 - (1) Maximum dispersion possible.
- c. Specialized training to cope with enemy atomic attacks.
- d. Maximum indoctrination concerning limitations and capabilities of bomb.
 - (1) Rapid decontamination of equipment and men.
 - (2) Maximum "digging in" of men and equipment.
 - (3) Use of engineers and other troops in new methods for digging in all troops.
 - (4) More intensive research in design and supervision of construction in field construction.

2. Conclusions and recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to our branch CE Consider:

- a. Disposition of troops in rear areas.
 - (1) Maximum dispersion of troops.
- b. Disposition of troops in the attack:
 - (1) This is command decision-line unit.
- c. Disposition and use of troops in the defense:
 - (1) Command decision.
- d. Availability and use of special technical personnel or troops in forward areas:
 - (1) Attack CBR Personnel:
- e. Training and indoctrination of troops:
 - (1) Maximum number of CBR supervisory personnel.
 - (2) Intensive indoctrination concerning atomic weapons. Keep the troops informed.
 - (3) Eliminate fear. Psychological training is important.
 - (4) More intensive use of atomic warfare aspects in CFX and field exercises in all troop units.

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3. Missions best suited to Department of Army in future tests, with regard to troop training and further experimentation of any military nature:

a. Accurate determination of the effects of the A-bomb on personnel and equipment for all types of blast, air, underwater, ground and underground.

b. Means of getting a more realistic method of technical evaluation of the use of atomic weapons not only its effect on our own troops but its lethal effect on enemy. Soldiers should be taught that bomb is a tremendous asset to use in many situations - make enemy fear it.

c. Assume an independent airborne operation on a test site, then drop a bomb. Follow up immediately with parachute unit actually parachuting into area with some heavy equipment; then evaluate results.

d. Drop an atomic bomb in Korea on suitable tactical target sufficiently close behind lines so that quick linkup can be made. Drop parachute unit into area. Capture maximum number of prisoners. Interrogate them closely to determine effects on enemy personnel and equipment.

e. Develop detailed and standard SOP's on the subject of dispersion of troops and equipment in view of the great present differences of opinion concerning this aspect of defense.

f. In order that all troops get necessary information develop the following program immediately:

(1) New approved manual of instruction for all Department of Defense personnel.

(2) Eliminate the tendency for poor instruction by producing the best possible training aids--specially films, slides and charts.

(3) Declassify most of the information now secret.

(4) Devote more effort to coordinated instruction between civilian population and defense personnel as follows: Disaster relief due to atomic blast, water supply, etc. Have combined field exercises in greatly populated areas so that civilian defense agencies, National Guard and Regular Army personnel will gain experience in a common task. Recommend specific policies and procedures to be followed by Army: In view of the apparent differences between AEC and the Army, and if these differences are deterring the present Army program, the Army should appeal to higher authority for a resolution of these differences which may deter progress in developing the tactical use of the atomic bomb. Institute continuous training for all Department of Defense personnel in all aspects of the atomic weapon.

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

16 November 1951

RADIOLOGICAL SAFETY PLAN
FOR EXERCISE DESERT ROCK II

1. The following is Rad-Safe plan for military participation in Exercise Desert Rock II.

2. Activities prior to D-Day:

- a. Indoctrination of all observer military personnel in the characteristics of nuclear explosions and the general effects of the atomic weapons (AFSWP).
- b. Issue of a film-badge to each observer.
- c. Calibration-check of all radiec instruments to be used in the exercise (Cml O).
- d. Instruction of all monitoring personnel in their specific assignments and duties. (Cml O).
- e. Procurement of additional clothing and boots, to be issued in the event of contamination of personal clothing. (QM)
- f. Preparation of Personnel & Vehicle Decontamination Station, to be located at Co. "C" CP, 231st Engr.

3. Activities on and after D-Day:

- a. Physical check on all observers, as they entruck, to ensure that they are equipped with film badges and gas mask. (This duty will be performed by the MP assigned to the observer vehicle.)
- b. Vehicles dispatched from Desert Rock will not be permitted to pass beyond a limiting point to be (designated) by the RadSafe Officer. ?
- c. A radiological survey will be made by the Rad-Safe Officer (Maj Servis, Cml Corps), who will report to the staff Cml Officer, Camp Desert Rock (Col Whitesides), on limits of advance into the contaminated area. ?
- d. Upon exit of the observers from the forward area (on Observer-Day), they will be monitored. An MP road-block will be established for control purposes. Tolerance for this operation will be an intensity reading of 20 MP-hour, with the beta shield open and held six inches from the body. Personnel whose body or clothing give a reading in excess of this tolerance will be decontaminated. *
- e. Decontamination of Test Equipment will be covered in separate instructions to the Effects Evaluation Teams.
- f. Rad-Safe Officer will establish his headquarters at the Desert Rock Observation Point.

4. Radiation Tolerance Limit: *

- a. Total: Three (3) roentgens.

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

11 November 1951

DECONTAMINATION PLAN

1. Decontamination of the test equipment will be carried out according to the following plan:

a. The purpose of this decontamination is to remove radioactive contamination utilizing only TO&E equipment that is found in a battalion or smaller unit.

b. Three types of decontamination methods are to be used in this test. These methods are to be dry decontamination (brushed), semi-wet decontamination (damp rags) and wet decontamination (washing).

2. Sites for these stations will be selected by the chemical officer.

3. Drivers of all test vehicles and decontamination representatives of the technical services will be reported to the Chemical Section. A 2-hour course in decontamination will be given on Tuesday 13 November 1951 at 1400 hours for the above mentioned people.

4. When the equipment is released from the test areas by the OIC, the personnel mentioned in paragraph 3 will proceed with their equipment to the designated decontamination areas.

5. Engineers will provide two trucks with 3000 gallon water tanks, pumps, and hoses at station three.

6. Evaluation, decontamination, radiological safety personnel and drivers of the test vehicles will draw film badges from Signal Corps. fb

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

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Report on Radiological Safety and Decontamination Operations, Exercise Desert Rock II and III

1. The following operations were conducted by the Chemical Section before, during and after Shot-Days for Exercise Desert Rock II and III.
2. The Staff Chemical Officer was responsible for all Rad-Defense matters pertaining to the operations.
3. Activities prior to Shot-Day:
 - (a) Indoctrinated all participating military personnel in the characteristics of nuclear explosions and the general effects of atomic weapons.
 - (b) Conducted a calibration check of all radiac instruments used during the exercise.
 - (c) Instructed all monitoring personnel as to their specific assignments and duties.
 - (d) Prepared plans for the installation of Personnel and Vehicle Decontamination Stations to be set up at AEC Camp No 1, 4 miles South of "S" Shot Ground Zero.
 - (e) Installed high intensity film badges in revetted and unrevetted foxholes, emplacements, and on equipment as directed in Film Badge Layout Plan.
 - (f) Installed chemical items of equipment for test.
4. Activities on Shot-Day:
 - (a) Chemical monitors conducted a physical check on all observers as they boarded buses for the Observation Point, to insure that they were equipped with film badges.
 - (b) Assigned one Chemical Officer as a monitor to the VIP's.
5. Activities after Shot-Day:
 - (a) Following notification by the AEC of clearance into the test area an initial radiological survey was made by the Rad-Defense Officer who reported to the Staff Chemical Official, Camp Desert Rock, on the limits of advance into the Contaminated area.
 - (b) The Staff Chemical Officer reported to the Commanding General the limits of intensities in the area.
 - (c) On the day the observers entered the area, Chemical Corps monitors under the supervision of the Staff Chemical Officer and Rad-Defense Officer were assigned to each observer-Bus for Rad-Defense measures. The monitors performed their assigned duties while in area and collected all film badges after clearance from the area. Due to the fact personnel did not debark from the buses while in the shot area personnel monitoring was not performed. *

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(d) Provided monitors for each evaluation team that went into the forward area.

(e) Set up equipment and personnel decontamination stations at Camp No 1.

(f) Collected all evaluation personnel film badges and turned the badges into the film badge laboratory located at the ABC Control Point.

(g) Obtained the film badge report from the laboratory and maintained an operational chart on total dosage received by each member of the evaluation team.

(h) Chemical personnel recovered the high intensity film badges and evaluated the damage to Cml Equipment.

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1 December 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 S-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 Signal Officer.
- (3) Violations will be reported through Signal channels to the S-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 DR badges (see par 4c) or bearing other media of authorization.
- f. Access to Campsite. Access to 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.

-1-

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Defense personnel found to be absent without authority will be reported at once to the S-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 S-2, this headquarters.

c. Security Passes and Permits. (1) DR badges will be issued by the AGC 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 DR badge.

(3) DR badges will be turned in upon notification by S-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 S-2, this headquarters.

BY COMMAND OF BRIGADIER GENERAL FITCH:

H. B. STORKE
COLONEL ARTY
Chief of Staff

OFFICIAL:

James J. Crawley
JAMES J. CRAWLEY
MAJOR AGC
Adjutant

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Administrative Study of the Terrain
In the "Desert Rock" Area

1. The Area:

a. The area studied is located 56 miles northwest of Las Vegas, Nevada, on US 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) US Department of Interior Geological Survey
Nevada-California
Las Vegas,
N 3600 - W 11500/40 1908

2. Purpose: The purpose of the study is:

a. To familiarize test personnel with terrain feature and climatical conditions in test area.

3. General Description of the Area:

a. Climatic. Existing climate is dry, hot. Wind of approximately 15 MPH from the south to the north from late morning until sunset. Possibility of flash thunderstorms with a 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 airfields. 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 sage 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 has been constructed at Yucca Flat.

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(4) Cultural Features. The dominant feature of the area is the two lane, high speed road recently built through the area from US Highway 95 north to Yucca Pass. 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: passes to south; main valley and road to the south.

(2) Hill 58.40 - 412.25 Altitude 7135. Observes: passes toward south; entire northern valley.

(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.

(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.

(6) Yucca Pass 58.50 - 408.80. High ground here on either side of main N - S road. Ridge on eastern side of road commands Yucca Flat, airstrip and observes entire northern valley to the north.

(7) Hill 59.50 - 498.40 Altitude 5270. Observes: Yucca Flat, airstrip, main road south from Yucca Pass.

(8) Skull Mountain 57.30 - 407.00 Altitude 5950. Observes: Flat ground north.

(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.

(10) Hill 57.60 - 405.40 Altitude 5000. Observes: Pass to west around Specter 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.

(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.

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

c. Obstacles. The only natural obstacles to test 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.

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 the ground troops, but such concealment is sparse and easily penetrable. The only defilade is provided by high ground.

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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.

(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).

(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.

(3) Access to the area from the northwest is nonexistent because of rugged mountains and no road or rail net.

(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 air strip at Yucca Flat, a dirt road from the southeast across Frenchman 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 enable 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 guard the northeastern approach to the area.

Joseph A. Wright
JOSEPH A. WRIGHT
Major, Artillery
S-2

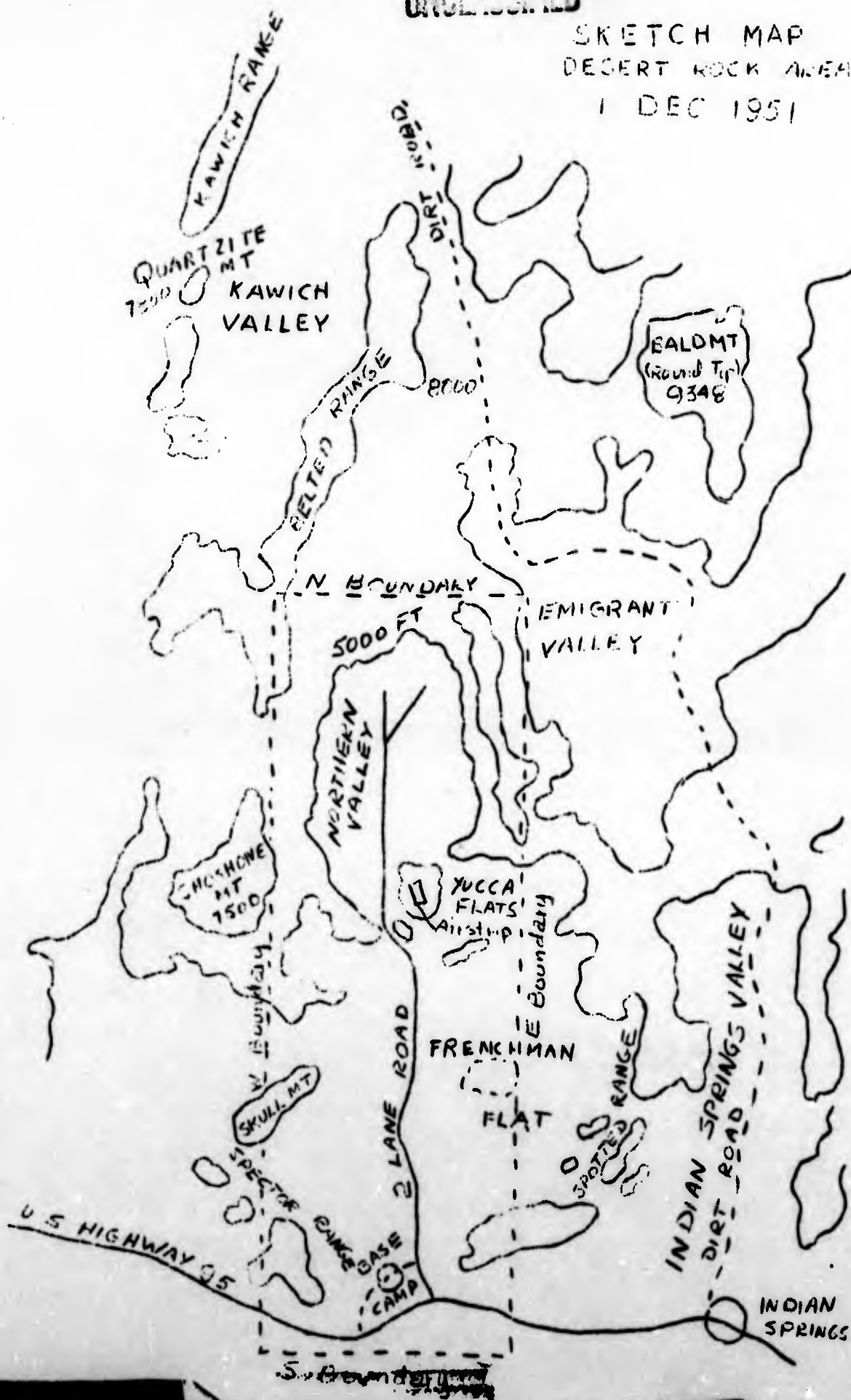
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SKETCH MAP
DESERT ROCK AREA
1 DEC 1951

SKETCH MAP

DESERT ROCK AREA

1 DEC 1951



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EXERCISE DESERT ROCK III



1 KT

Underground Shot
29 November 1951

Page III

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Detailed Drawings of Test Emplacements - Tab III-B
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2. Test Results - General Summary. Pages 144-154
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PART III

Exercise Desert Rock III

Section A - Effects Test Report:

1. Test Plan - General Summary.

a. In this test, typical and special Army field emplacements, materiel and equipment were positioned from 100 yards out to 1000 yards from the underground zero point. The layout consisted of seven test positions. Positions 1 and 2 were located at 100 and 200 yards along a northeast line from zero point. Positions 3, 4, 5, 6 and 7 were located at 300, 400, 633, 800 and 1000 yards, respectively, along a south line from zero point. Interspersed between the test positions were two lines of two-man foxholes, revetted and unrevetted, alternately end-on and side-on to zero point. Along the northeast leg the foxholes extended from 100 to 666 yards, and on the south leg from 347 to 966 yards from zero point. The detailed layout and contents of each test position are shown in the following diagram (Fig. 7).

b. The preparation of emplacements, placement of materiel, equipment and film badges, pre-shot and post-shot photography, damage evaluation and restoration of the area were carried out as described in Tabs III-A, III-B and III-C.

2. Test Results - General Summary.

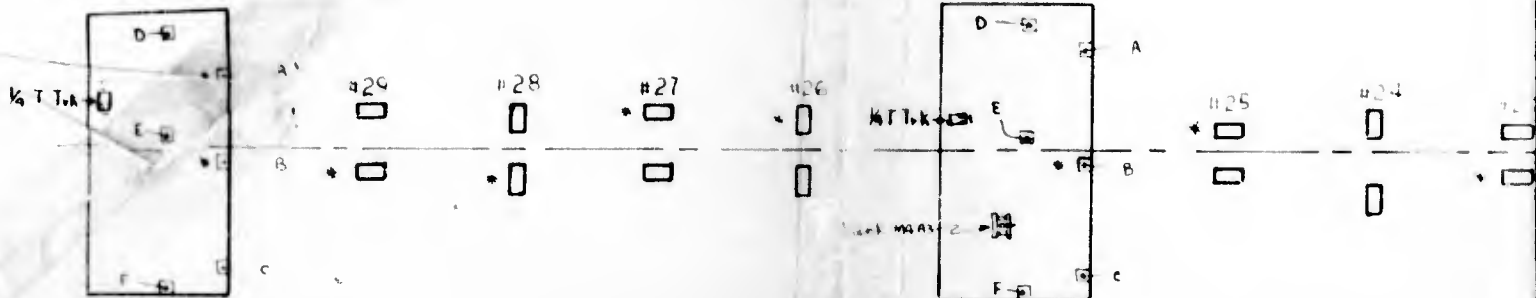
a. General (See Tab III-D)

(1) The underground shot of the 1 KT yield test weapon was fired at 1200 hours on 29 November 1951. The light, changeable winds which existed at H-hour did not carry the contaminated cloud away as rapidly as was the case of the surface shot. This, coupled with the fact that the underground shot deposited a large amount of contaminated dust on the ground, delayed entry into the test area for damage assessment purposes. Only a limited assessment of damage could be made of the test items in

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PSN # 7 (3000')

PSN # 6 (2400')



Psn # 7

Psn # 6

Psn # 5

A
OBSERVATION POST

4. Cans, Water 5 gal
(one can water closed, one can open on surface, one can closed, one open in emplacement)
2. Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

B
MG EMPL
(Horse shoe Type)

C
81 MM MORT EMPL

1. EE 8 Telephone
2. Radios, SCR-300
(one on surface, one in emplacement)

D

Two Man Foxhole w/c

2. Uniformed dummies w/rifle Cal 30 M-1
(one in hole, one on surface w/compass lensatic)
2. Mask, Gas, Service

A
OBSERVATION POST

4. Cans, Water 5 Gal
(one can water closed, one can open on surface, one can closed, one open in emplacement)
2. Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

B
MG EMPL
(Horse shoe Type)

1. LMG Cal 30 on surface
1. HMG Cal 50 in emplacement

C

81 MM MORT EMPL

1. EE 8 Telephone
2. Radios SCR-536
(one on surface, one in emplacement)

D

Two Man Foxhole w/c

2. Uniformed dummies, one w/AR Cal 30 on surface

4. Cans, Water 5 Gal
(one can water closed, one can open on surface, one can closed, one open in emplacement)
2. Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

1. LMG
1. HMG

1. EE 8
2. Radios
(one on surface, one in emplacement)

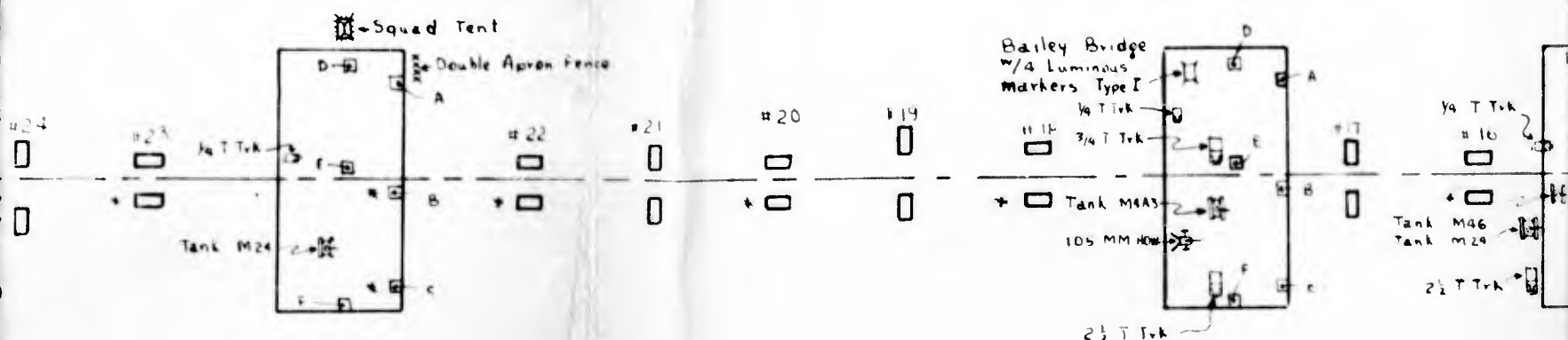
2. Uniformed dummies

1

PSN # 5 (1900')

PSN # 4 (1200')

PSN # 3



PSN # 5

PSN # 4

PSN # 3

A
OBSERVATION POST

4. Cans, Water 5 Gal
(one can water closed, one can open on surface, one can closed, one open in emplacement)
- 2 Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

B
MG EMPL

1. LMG Cal 30 on surface
1. HMG Cal 30 in emplacement

C
81 MM MORT EMPL

1. EE 8 Telephone
2. Radios, SCR 300
(one on surface, one in emplacement)

D

- Two Man Foxhole 1/4
2. Uniformed dummies 1/4 rifle Cal 30 M-1

A
OBSERVATION POST

4. Cans, Water 5 Gal
(one can water closed, one can open on surface, one can closed, one open in emplacement)
2. Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

B
MG EMPL

- (Horseshoe Type)
1. LMG Cal 30 in emplacement

C
81 MM MORT EMPL

1. EE 8 Telephone
1. Switchboard BD 72
2. Radios SCR 536
(one on surface, one in emplacement)

D

- Two Man Foxhole 1/4

4. Cans, Water 5 Gal
(one can water closed, one can open on surface, one can closed, one open in emplacement)
2. Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

B
MG EMPL

1. LMG Cal 30 in emplacement

C
81 MM MORT EMPL

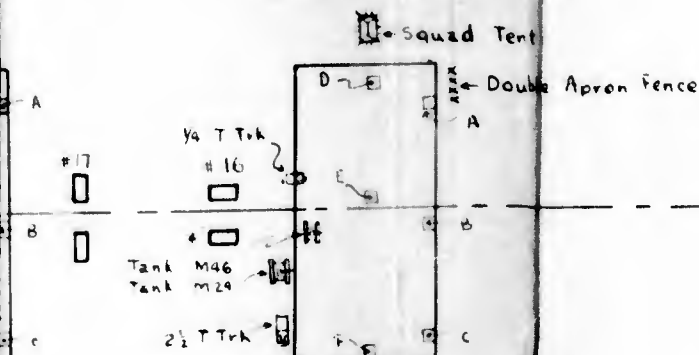
1. EE 8 Telephone
2. Radios SCR 536
(one on surface, one in emplacement)

D

- Two Man Foxhole 1/4

00')

PSN # 3 (900')



Psn # 3

A
OBSERVATION POST

- 4. Cans, Water 5 Gal
(one can water closed, one can open on surface, one can closed, one open in emplacement)
- 2. Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

B
MORT EMPL

(Horsehoe Turn)

- 1. HMG Cal 50 in emplacement

C
81 MM MORT EMPL

1 EE 8 Telephone

D
Two Man Foxhole w/c

- 2. Uniformed dummies w/rifle Cal 30 M-1
(one in hole one on surface w/compass lensatic)
- 2 Mask Gas Service
(one with each dummy)
- Shelter tent adjacent to hole

E
57 / 75 MM RR EMPL

57 MM RR Mounted

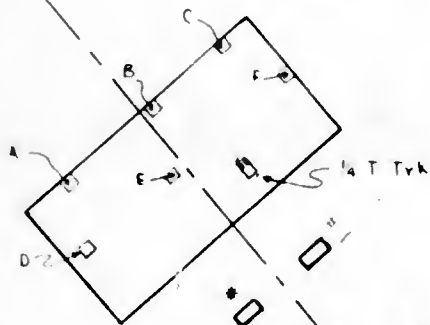
Psn # 1

A
OBSERVATION POST

- 4. Cans, Water 5 Gal
(one can water closed, one open on surface, one can closed, one open in emplacement)
- 2. Cases "C" Rations
(one case on surface, one case in emplacement)
- Assorted perishables & Salt

GROUND ZERO

PSN # 1 (500')



PSN # 2 (600')



Standard two man foxholes

PSN # 2

A
OBSERVATION POST

4. Cans, Water 5 Gal

(one can water closed, one open on surface
one can closed, one open in emplacement)

2. Cases "C" Rations

(one case on surface, one in emplacement)

Assorted supplies & Salt

4

N

V

N * 2 (600')

Antile Aron Fence

2 1/2 T Trk

5 105 MM HOW

Tank M4A3

Tank M24

0 3

Standard two-man foxholes in pairs

on surface
(ent)

acement)

4

5

one in hole, one on surface w/compass lensatic)

2 Mask Gas Service

(one with each dummy)

Shelter tent adjacent to hole

E

57 & 75 MM RR EMPL

47 MM RR Mounted

Assorted medical supplies on surface adjacent to hole

F

SPL MG EMPL

1 EE 8 Telephone

4 Coils No 114

(Two on surface, two in emplacement)

* Various wire circuits laid between Pns C & F

D

Two Man Foxhole w/c

2 Uniformed dummies one w/AR Cal 30 on surface
w/compass lensatic one in hole w/rifle Cal 30 M1)

2 Mask Gas Service

(one with each dummy)

Shelter tent adjacent to hole

E

51 & 75 MM RR EMPL

75 MM RR Mounted

Assorted medical supplies on surface adjacent to hole

F

SPL MG EMPL

1 EE 8 Telephone

4 Coils No 114

(Two on surface, two in emplacement)

* Various wire circuits laid between Pns C & F

2. Uniformed

(one in

2. Mask

(one w

Shelter

57 MM

Assorted

to hole

1 EE 8 T

4 Coils

(Two on

* Various w

* Indicate

(one exp

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1

Two Man Foxhole $\frac{1}{2}$
dummies $\frac{1}{2}$ rifle Cal 30 M 1
hole, one on surface $\frac{1}{2}$ compass lensatic
Gas Service
th each dummy)
nt adjacent to hole

E
57 & 75 MM RR EMPL
R Mounted
medical supplies on surface adjacent

F
SPL MG EMPL
lephone
o 114
surface, Two in emplacement)
re circuits laid between Pns C & F

es one pair thermal indicators
ed, one in emplacement)

(one on surface, one in emplacement)

D
Two Man Foxhole $\frac{1}{2}$
2. Un-Formed dummies, one $\frac{1}{2}$ AR Cal 30 on
surface $\frac{1}{2}$ compass lensatic, one in hole $\frac{1}{2}$ rifle
Cal 30 M 1
2. Mask Gas Service
(one with each dummy)
Shelter tent adjacent to hole

E
57 & 75 MM RR EMPL
75 MM RR Mounted
Assorted medical supplies on surface adjacent
to hole

F
1. EE 8 Telephone
4 Coils No 114
(Two on surface, two in emplacement)
: Various wire circuits laid between Pns C & F

2. Un-Formed dummies
(one in hole, one on
2. Mask Gas Service
(one with each dum
Shelter tent adjacent

57 & 75 MM
57 MM RR Mounted
1. Sniperscope
Assorted medical suppl
to hole

LEE 8 Telephone
4. Coils No 114
(Two on surface, two
: Various wire circuits

* Note: Wire Circuits at seven major test positions
are as follows

Three Circuits of each of several types
of wire; one circuit buried 8 inches below
surface; one circuit on ground, one circuit
suspended 3 feet above ground

Types of wire represented:

W D - 1 Wire
110 B Wire
(old) Spiral Wire
W-143 Wire

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1/2 rifle Cal 30 M1
surface 1/2 compass lensatic)

mm)
nt to hole
E
MM RR EMPL
d

plies on surface adjacent

F
Two on emplacement)
ts laid between Pns C/F

3

A
OBSERVATION POST

- 4 Cans, Water 5 Gal
(one can water closed, one open on surface
one can closed, one open in emplacement)
- 2 Cases 'C' Rations
(one case on surface, one can in emplacement)
- Assorted perishables & Salt

B
MG EMPL
(Horseshoe Type)

- 1 LMG Cal 30 in surface
- 1 HMG Cal 30 in emplacement

C
81MM MORT EMPL

- 1 EE 8 Telephone

D
Two Man Foxhole 1/2

- 2 Uniformed dummies 1/2 rifle Cal 30 M1
(one in hole, one on surface 1/2 compass lensatic)
- 2 Mask, Gas Service
(one with each dummy)
- Shelter tent adjacent to hole

E
57 & 75 MM RR EMPL

- 57 MM RR Mounted
- Assorted medical supplies on surface
adjacent to hole

F
SPL MG EMPL

- 1 EE 8 Telephone
- 4 Coils No 114
(Two on surface, two in emplacement)
- Various wire circuits laid between pns C/F

A
OBSERVATION

- 4 Cans, Water 5 Gal
(one can water closed
one can closed, one open)
- 2 Cases 'C' Rations
(one case on surface)
- Assorted perishables & Salt

B
MG EMPL
(Horseshoe Type)

- 1 LMG Cal 30 on surface
- 1 HMG Cal 30 in empl

C
81MM MORT

- 1 EE 8 Telephone
- 1 Switchboard BD 72

D
Two Man Foxhole

- 2 Uniformed dummies one
surface 1/2 compass lensatic
1/2 rifle Cal 30 M1
- 2 Mask, Gas Service
(one with each dummy)
- Shelter tent adjacent to

- 57 & 75 MM RR EMPL
- 75 MM RR Mounted
- Assorted medical supplies
adjacent to hole

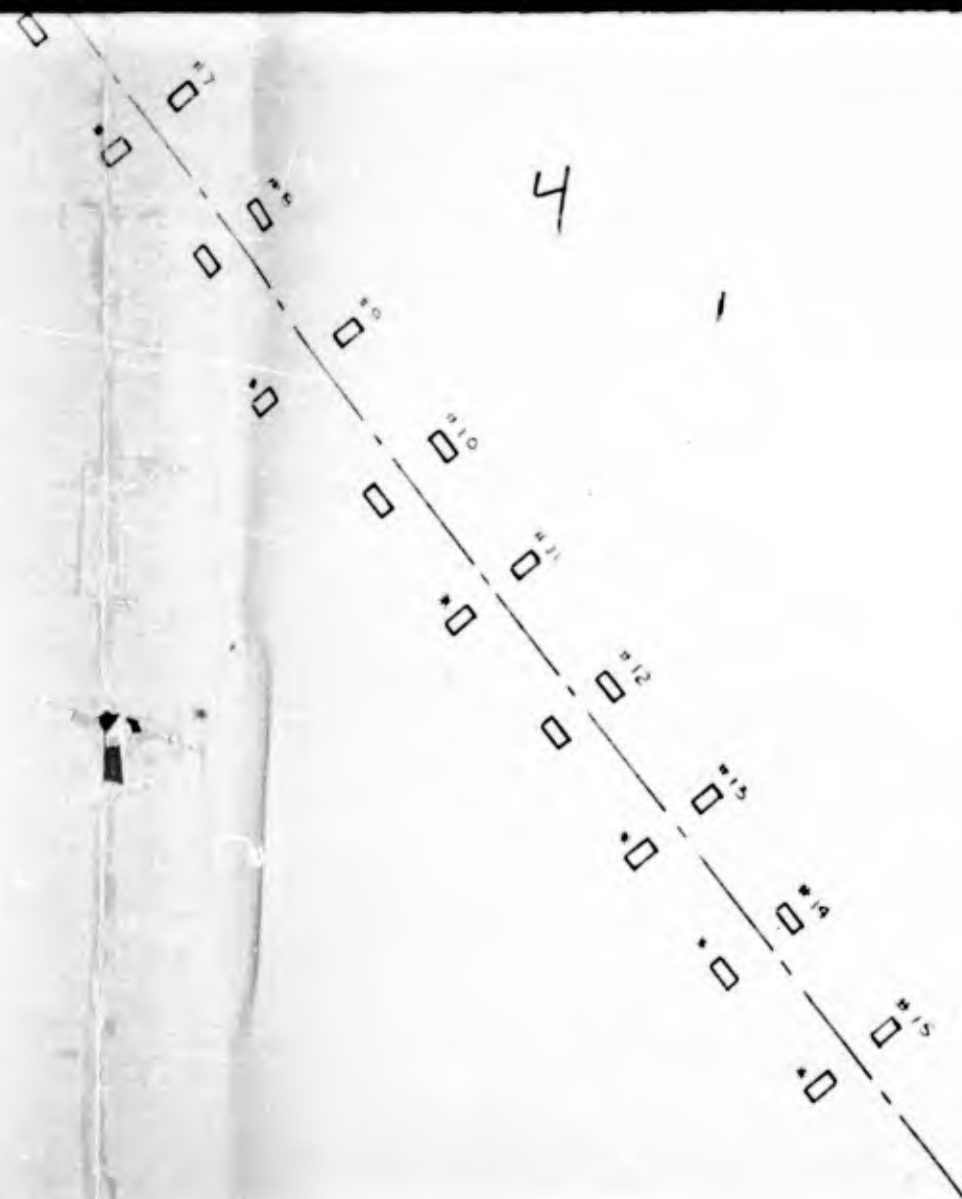
F
SPL MG EMPL

- 1 EE 8 Telephone
- 4 Coils No 114
(Two on surface, two in)
- Various wire circuits laid

8

1

TION POST
 al
 used one open on surface
 open in emplacement)
 ace one in emplacement)
 f Salt
 B
 MPL
 e Type)
 surface
 emplacement
 MORT EMPL
 12
 ashole w/c
 es one w/AR Cal 30 on
 ensatic, one in hole
 1
 e
 ummy)
 ent to hole
 RR EMPL
 ed
 applies on surface
 EMPL
 in emplacement)
 1' between posts C/F



LAYOUT OF TEST POSITIONS EXERCISE DESERT ROCK III

S-3 SECTION - CAMP DESERT ROCK

Scale 1" = 100'

DRAWN BY
RUB

DATE
21 Nov 50

Smith
 SMITH S-3
 Maj Arty

FITCH
 Brig G

on surface
(cement)
placement)

Cal 50 on
in hole

urface

ment)
psns C/F

4

5



**LAYOUT OF TEST POSITIONS
EXERCISE DESERT ROCK III**

S-3 SECTION - CAMP DESERT ROCK, NEV

Scale 1" = 100'

DRAWN BY
RLB

DATE
21 November 1951

9
Smith
SMITH S-3
Maj Arty

FITCH
Brig Gen

10

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* in Positions 1 and 2. The test items at these positions cannot be removed for several weeks due to the low total dosage limitation of 3r placed on all test personnel. Position 3 at 300 yards could not be entered for evaluation purposes until 10 December 1951 (nearly two weeks after the shot).

b. Effects on Materiel (See Tab III-E)

(1) In this test the damage to major items of equipment and materiel extended out to Position 2 which was 200 yards from the zero point. The general level of damage was somewhat lower than in the surface shot. Damage to, and loss of small articles of equipment extended beyond Position 2, but it is not felt that damage to these items would seriously affect the immediate combat capability of an organization. In the main, the damage to equipment and materiel was caused by air blast from this shot. Typical examples of damage at Position 2 (200 yards) are:

1/4-ton truck.....	Steering column bent, windshield ripped off. <u>Unserviceable.</u>
Bailey Bridge.....	Moved 6". Flooring and walkways dislodged. <u>Serviceable</u> with minor repair.
105 mm Howitzer.....	Needed cleaning. <u>Serviceable.</u>
Tanks.....	Minor damage, hatch twisted. <u>Serviceable.</u>

The radiation level at this position prevented a detailed assessment of damage at Positions 1 and 2 at the time this report was written.

c. Effects on Emplacements (See Tab III-F).

(1) In this test the most distant revetted emplacement which collapsed to an appreciable degree was the two-man foxhole with overhead cover at 412 yards. The most distant unrevetted emplacement which suffered severe damage was the two-man foxhole without overhead cover at 566 yards.

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d. Photos showing Typical Damage at the various positions.
(to be inserted when available).

(1) For comprehensive photo-coverage of damage,
see Tab III-G.

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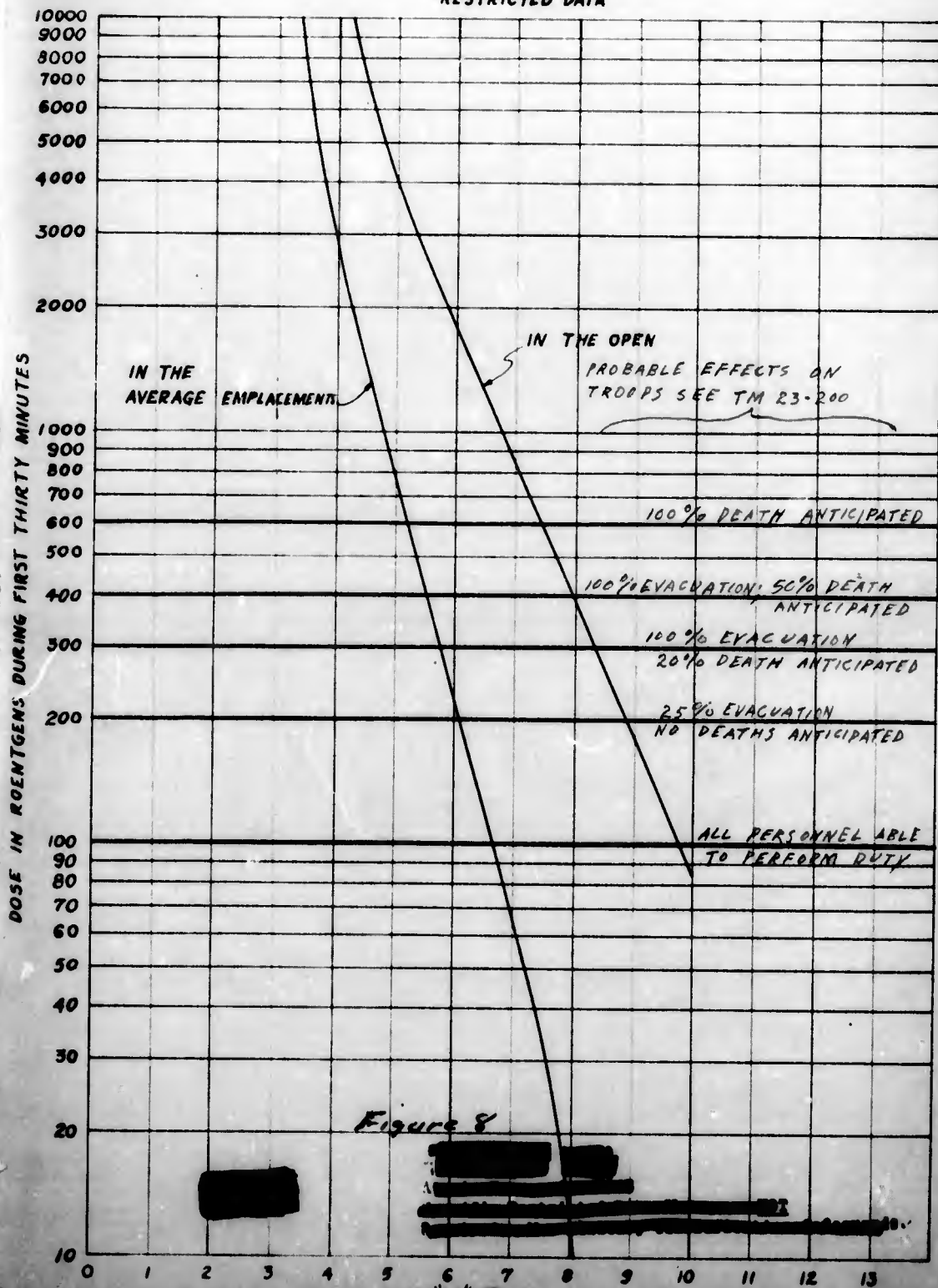
c. Film Badge Results (See Tab III-H).

(1) Approximately 80% of the film badges placed in equipment and emplacements were recovered. A substantial amount of the initial radiation following the underground shot came from the low radioactive cloud which covered the test positions. This cloud had moved down-wind from Desert Rock III positions by H + 30 minutes. Thus the dosage during the first 30 minutes is of primary interest. This is shown in the following two figures for the two position lines of Desert Rock III:

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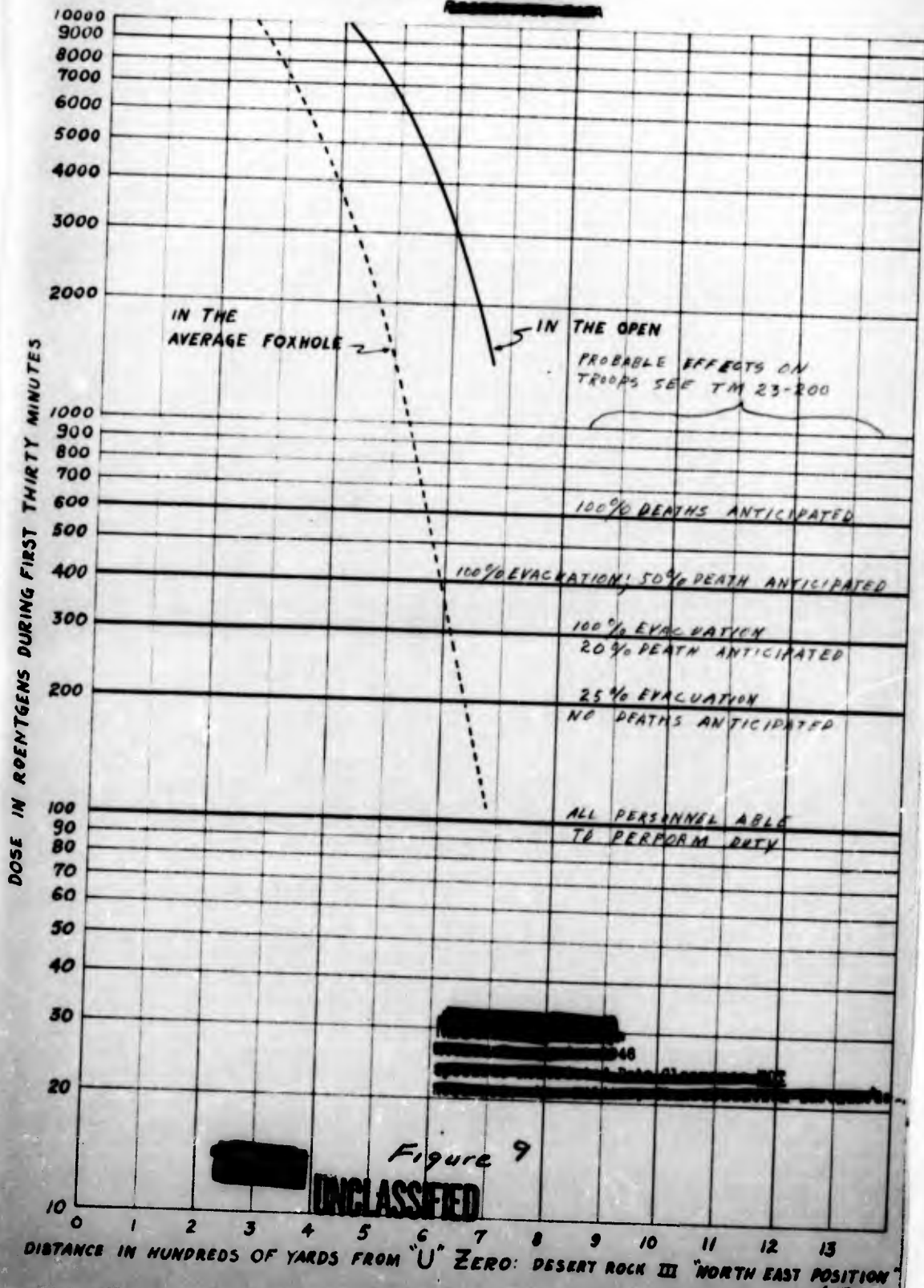
RESTRICTED DATA



DISTANCE IN HUNDREDS OF YARDS FROM "U" ZERO: DESERT ROCK III 'SOUTH POSITION'

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(2) Along the NE line of positions, the average foxhole gave roughly 75% protection from the radiation. Along the S line of positions, the average emplacement gave roughly 85% protection. The per cent protection apparently depends upon how close the center of the cloud comes to a particular foxhole or emplacement, and the interested reader is asked to consult Tab III-H for details.

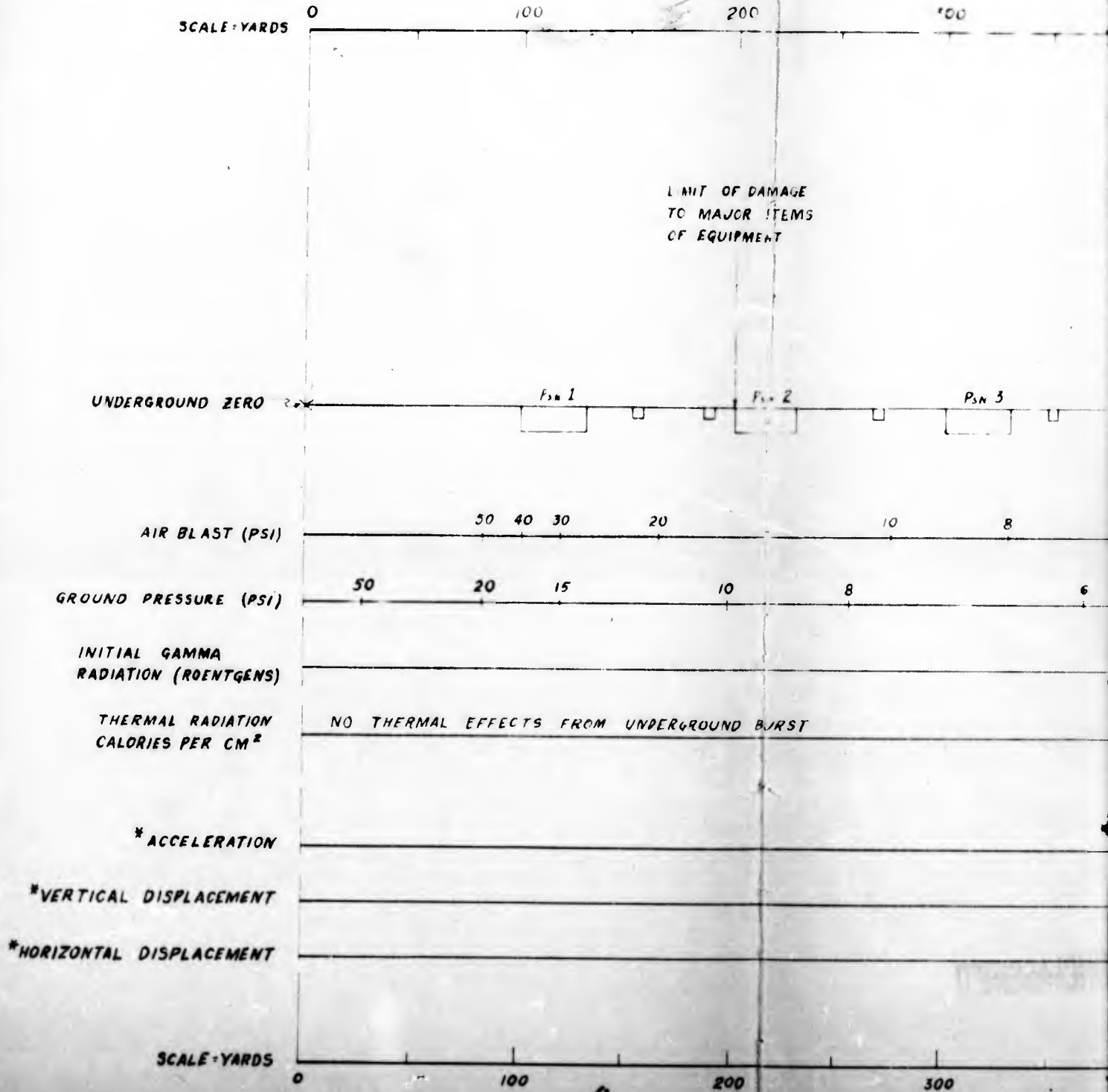
(3) The Effects Test Group of Operation JANGLE supplied the information concerning the residual contamination on the ground following the explosion. This is shown in the following figure. It should be noted that a serious radiation problem exists after the radioactive cloud has moved away down-wind.

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*NOTE: THIS INFORMATION NOT AVAILABLE AT THIS TIME.

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U SHOT

CORRELATION OF DAMAGE WITH CAUSATIVE FACTORS

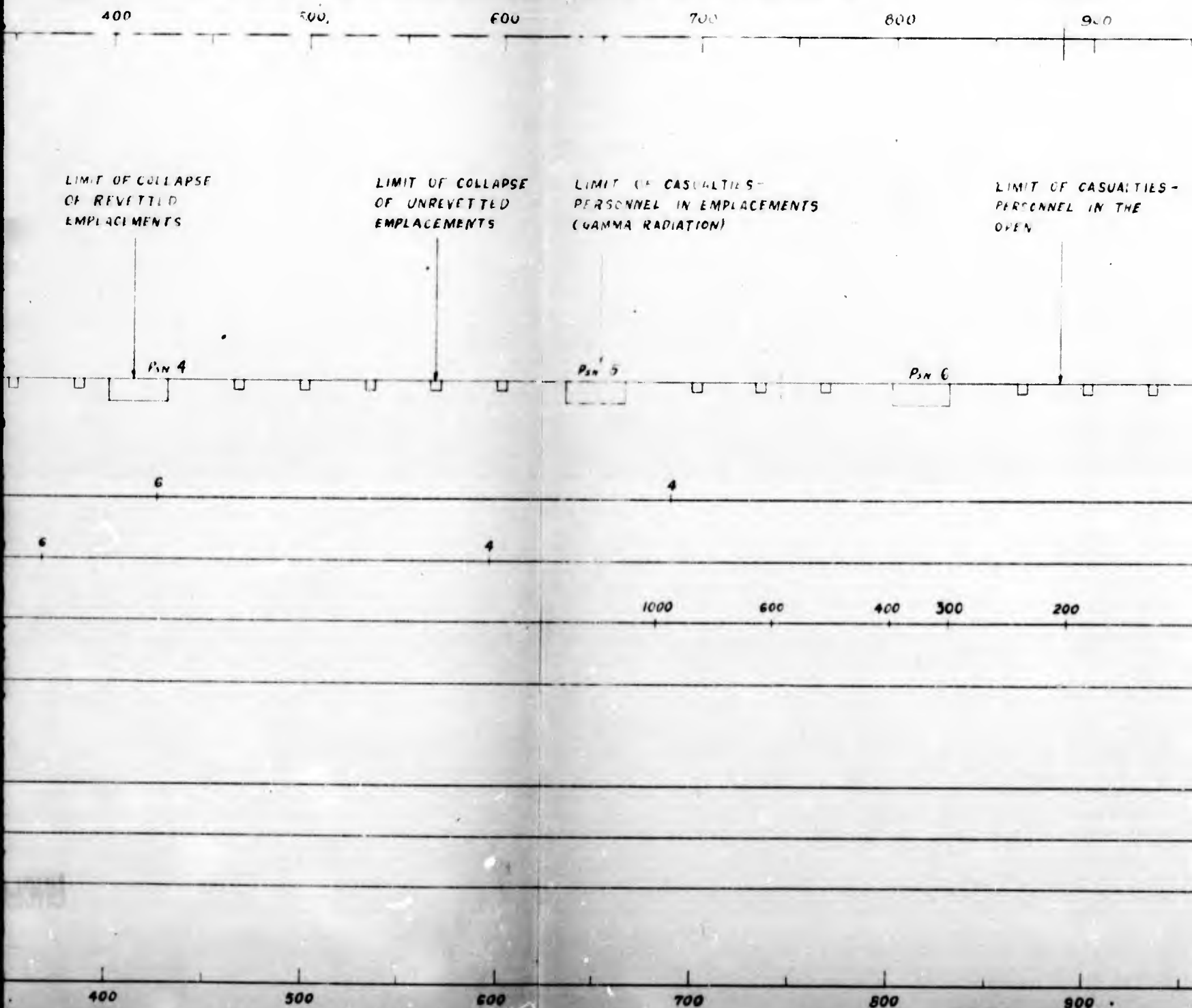
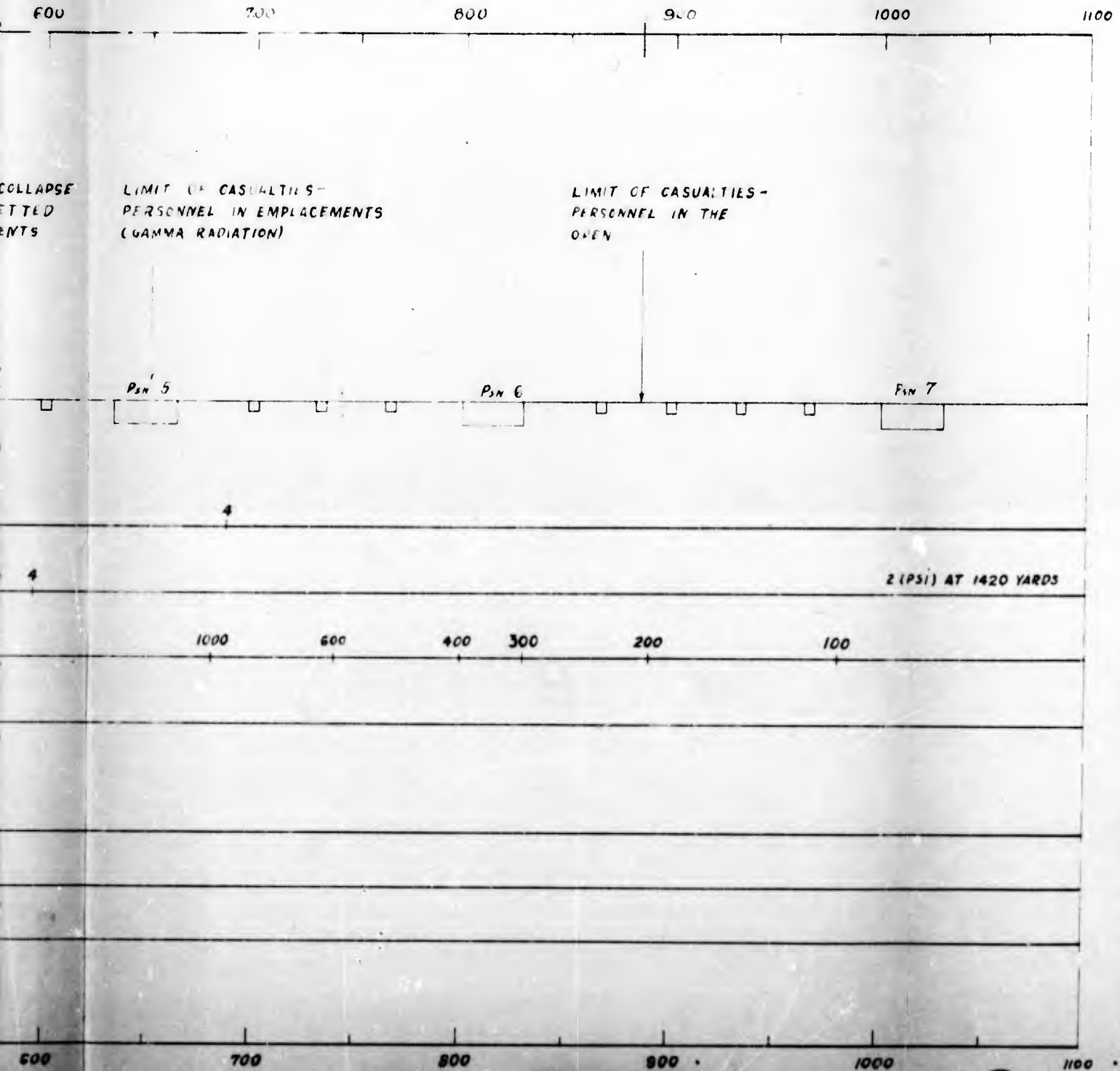


FIGURE 12

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CAUSATIVE FACTORS



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f. Effects on Food and Water (See Tab III-I)

(1) There was no neutron induced radioactivity in the food and water following the underground burst because the neutrons were absorbed in the earth. Food and water in unbroken containers was not contaminated by fission products. Meat exposed with no cover was edible on D + 8 days after 1/2" of the outside contaminated surface had been removed.

g. Effects of Radioactive Dust (See Tab III-J).

(1) A radioactive dust hazard existed following the underground shot. The service gas mask offers protection against this hazard.

h. Effects on Animals (See Tab III-K)

(1) Dogs and sheep were exposed by the Effects Test Group of Operation JANGLE. Of these, about 30 per cent died between D + 4 and D + 8 days. No data is available after D + 8 days. The animals who died exhibited the symptoms of radiation sickness. Their body tissue contained radioactive material, indicating the ingestion and/or inhalation of radioactive dust.

3. Conclusions.

a. The major damage to emplacements from the underground burst resulted from the ground shock. The initial gamma radiation and the residual radiological contamination provided the greatest personnel casualty effect. The damage to the major items of material and equipment, which were above ground, was due to air blast effects in most cases.

b. The residual contamination on the ground from the underground burst was sufficient to preclude occupancy of a large area for a period of days after the burst. In this test, an area of more than three square miles was contaminated to a degree that would have prevented continuous occupancy, even under combat conditions, for at least two days. However, personnel, especially those in vehicles, could and did pass through this area a few hours after the burst.

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[REDACTED]

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c. From this underground explosion the effects of contamination of equipment, which could be removed from the area of heavy contamination, was not militarily significant beyond the range of severe damage from other causes. The contamination was removed by simple field decontamination methods. There was no neutron induced radioactivity in equipment beyond the immediate area of the crater.

d. Typical field emplacements without overhead cover provided approximately 75% protection against the gamma radiation from the atomic cloud passing over them. The question of the protection afforded by overhead cover was not answered by this experiment. (This is explained in Tab III-H).

e. Typical field emplacements provided about 75% protection from the residual radiation (contaminated dust on the ground and in the emplacements).

f. The special machine gun emplacements did not appear to exhibit any particular advantage over the standard emplacements in their resistance to blast or nuclear radiation effects.

g. Rations and water in closed and intact containers following the underground explosion were usable.

h. Exposed meat (beef) which was contaminated was decontaminated to a safe level by cutting away about one inch of the outside surface layer.

Section B - Operational Report:

1. General Summary.

(a) This portion of the report on Exercise Desert Rock III again deals with the operational support for the effects test. The experience in Desert Rock II showed that no major operational changes were necessary to effectively complete the assigned mission of Camp Desert Rock. As only 67 official observers attended the "U" [REDACTED] and that some of the camp *

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supporting troops could be returned to their home stations and phasing-out of units began. Participating units present in camp on 29 November 1951 are shown on the attach "Troop List", Tab III-L.

2. Observer Indoctrination and Training Program (See Tabs III-N and III-M).

a. An Observer Indoctrination and Training Program was also conducted for this part of Exercise Desert Rock. Discussion groups were formed and observers invited to give their impressions on how atomic weapons might alter our present doctrines of warfare. The group reports, detailed as Tab III-M, were very similar to the group reports of the observers of Desert Rock II. The class did not think that the atomic weapon will change the basic doctrines, tactics or techniques of any branch or arm of service, either in the attack, defense or in the rear areas. Emphasis on dispersion of all installations in the combat theater was thought necessary. There is no need to redesign present equipment. Radiac equipment should be issued to all troops but specialized personnel will not be necessary to operate and maintain the equipment. The present CBR and Signal Corps people could handle the job. No specialized training for troops is required but all individuals should be given an introductory course in atomic weapons, their effects, and individual protective measures required for safety.

3. Miscellaneous Operations.

a. Miscellaneous operational matters of general interest did not change for Test III. The comments listed below are the same as those for Exercise Desert Rock II but are repeated here for convenience.

(1) A radiological safety plan which essentially provided rad-monitors, with radine detection equipment, to accompany all personnel entering the shot area was issued. Film badges, when developed, disclosed the amount of radiation received

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*
? by the individual. A radiation tolerance limit was set at a total dosage of 3 roentgens. This tolerance was the same as that used by AEC and should not be construed as a military dosage tolerance. Details of the RadSafe plan are listed in Tab III-O.

(2) Since all personnel, materiel and equipment entering the test area were exposed to radiation contamination, a decontamination plan was necessary. Decontamination was accomplished by dry brushing, dusting with wet rags and washing. These methods were used on personnel and test items with excellent success. Details of this plan are attached as Tab III-P.

(3) Radiological safety measures were adequate as witnessed by the fact that no individual received a hazardous dosage of radiation. Personnel, test materiel and equipment decontamination was effective as all exposed items were reduced below a maximum residual radiation level limit of two milliroentgens per hour. A more detailed report is attached as Tab III-Q. *

(4) The high percentage of classified subject matter inherent in the operation necessitated positive counterintelligence measures. Details of the counterintelligence directive are listed as Tab III-R.

(5) A terrain study (Tab III-S) was prepared and disseminated for orientation purposes.

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

23 November 1951

EMPLACEMENT AND EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK III

SECTION I - GENERAL TEST PLAN

1. Summary

a. On U-Day the Cg Camp Desert Rock will conduct a test of military equipment, material, and emplacements by exposing them to effects of an atomic weapon at AEC Nevada Test Site in connection with AEC Operation Jangle. After the test an evaluation of damage to equipment, material, and emplacements will be made.

b. Test variables to be imposed are:

(1) Material and equipment will be placed both on the grounds surface and in fortifications and emplacements below the grounds surface.

(2) Normal types of tactical field fortifications and weapons emplacements will be constructed at test site.

(3) Items in para 1b (1) & (2) will be located at various distances from ground zero.

c. Assessment of damage will be made after the explosion with reports of the results compiled.

2. Basic Directive

Letter, Headquarters, Camp Desert Rock, to CG Sixth Army, dated 6 Nov 1951, Subject: Operation and Maintenance of Camp Desert Rock During and Subsequent to November, 1951, para 2b as follows:

"In coordination with AEC and AFSWP, participate in the remaining tests scheduled by AEC for November 1951, supplementing previous Army tests conducted in Exercise Desert Rock, to determine effects on Army fortifications, material, and equipment."

3. Test Objectives

a. To determine nature and extent of damage to standard military emplacements (FM 5-15) when subjected to the effects of an underground nuclear explosion.

b. To determine nature and extent of damage to various types of military equipment and material when subjected to the effects of an underground nuclear explosion. This will include assessment of servicability for immediate combat use.

c. To determine the degree of protection afforded individuals by standard field emplacements from nuclear radiation and blast effects of an underground nuclear explosion.

d. To determine by the use of film badges and observation of damage to emplacements the probable effects on personnel when exposed to the effects of an underground nuclear explosion.

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EMPLACEMENT AND EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK III
(Continued)

SECTION I - GENERAL TEST PLAN

4. Means of Accomplishing Test Objectives

a. Emplacements:

(1) Two lines of foxholes will be constructed starting 300 feet from ground zero, and extending out to 3000 feet. The foxholes will be in pairs, one revetted - one unrevetted, and alternating the long and short axis of each pair to the direction of the blast. (See Annex No. 1)

(2) Seven test positions, one each, at distances of 300 feet, 600 feet, 900 feet, 1200 feet, 1900 feet, 2400 feet, and 3000 feet from G. Z. (Annex 1), will be organized. In each position there will be constructed six different emplacements. (See Annex No. 1)

(3) Photographs of individual emplacements, both before and after atomic blast, will be taken to provide permanent visual record of shot effects.

(4) Post-shot evaluation of damage will be made and recorded by technical personnel.

b. Military Equipment and Material:

(1) Various small items of equipment and material will be placed in and around the six different emplacements at the seven test positions. (Annex 1)

(2) Various heavy equipment (tanks, vehicles, etc.) will be placed in the seven test positions, in rear of the emplacements. (Annex 1)

(3) Photographs will be taken of individual items before and after atomic blast to provide permanent visual record of effects of shot.

(4) Post shot evaluation of damage will be made and recorded by technical personnel.

c. Protection Afforded by Emplacements:

(1) FM-badges will be installed both in emplacements and on the surface to indicate comparative amounts of nuclear radiation received, thus providing a basis for estimate of protection afforded by digging - in.

5. Observer indoctrination ✓

During their stay at Camp Desert Rock observers will be familiarized with atomic weapons, their use and effect.

(a) A seven (7) day course of instruction on Atomic Weapons and related subjects will be conducted while waiting for the Atomic shot and radiation decay after the shot.

(b) Observers will witness the shot on U-day; and, residual radiation permitting, will be taken forward into the test positions after U-day to observe effects of radiation.

(c) Damage to personnel will be assessed by Effects Evaluation team and observers will be given results of this assessment.

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EMPLACEMENTS AND EQUIPMENT TEST PLAN FOR MORGINE DESERT ROCK III
(Continued)

SECTION I - GENERAL TEST PLAN

6. Reports

The data obtained from the Desert Rock III test positions supplemented by information furnished by the Effects Test Group of Operation JANGLE will be consolidated into a single report, to be prepared by the AFSWP Advisory Group under the direction of the Commanding General Camp Desert Rock.

SECTION II - DETAILED IMPLEMENTATION OF PLAN

1. Organization and Functions of Personnel

- a. Administrative relationships and groupings are shown in Annex 2.
- b. Functions and responsibilities of the individuals concerned with this plan are:

(1) OIC Effects Test

(a) Is responsible for complete organization, construction of emplacements, and, in coordination with Chiefs of Tech Services, Camp Desert Rock, the placement of equipment and material in the test area as indicated in Annex 1 and Annex 6.

(b) Effect coordination between Hq, Camp Desert Rock and the AFSWP Effects Evaluation Group on matters pertaining to testing of equipment, material, and emplacements, and the preparation of Effects Test Reports.

(c) Coordinate and supervise activities of Evaluation Teams in obtaining and reporting complete damage assessments, as quickly as practicable after shot day.

(d) Insure that sufficient guards are posted in the test area by 1600 hours U-3. The guards will be relieved during the night U-1 upon direction from Camp Desert Rock S-3. They will be re-posted after U-day upon clearance by Red-Safe O to enter the position and maintained until relieved by OIC Effects Test.

(e) Coordinate with OIC Photography to insure that pre and post shot photographs are completed as indicated. (Annex 9)

(f) Coordinate and supervise the prompt preparation of all reports called for in this plan, and prepare the report to be forwarded to OIC AFSWP Effects Evaluation Group.

(g) Coordinate with technical services on the removal of all test items after evaluation and the police of test shot area.

(2) OIC Technical Service Placement and Evaluation Teams

(a) Under direction OIC Effects Test place or construct test items as indicated in Annex 1 and Annex 6 in test positions.

(b) Obtain identification tags for each coded item of equipment and material as it is placed in the test position in accordance with the cataloging plan (Annex 3) and equipment location charts (Annex 1); place ground pins in the ground (Marking the shot location of all small items that are likely to be displaced by the explosion) with duplicate tag affixed to the ground pins.

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REPLACEMENT AND EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK III
(Continued)

SECTION II - DETAILED IMPLEMENTATION OF PLAN

(c) Make detailed damage evaluations of each item by completing final Damage Assessment Form (Annex 5) as quickly as test area is cleared for re-entry by Rad-Safe O. Reports to OIG Effects Test.

(d) Insure that all items of equipment and material for his tech service are evacuated to camp from test area after proper release from Rad-Safe O and AFSWP representatives. Damaged or unserviceable equipment to be surveyed.

(e) Cause Tech Damage Assessment to be completed at camp and written report submitted to OIG Effects Test.

(3) Camp Desert Rock Chiefs of Technical Services ✓

(a) Obtain the equipment and material prescribed by the CG, Camp Desert Rock for the test (Annex 3), and provide for its movement and placement into the test positions under direction of the OI Tech Service Placement and Evaluating Team, completing such movement by 1200 hours U-1 (Annex 6).

(b) Provide personnel for Tech Service Placement and Evaluation Teams as required by OIG Effects Test.

(c) On request, OIG Tech Service Teams, move equipment and material back from the test site to Camp Desert Rock, or dispose of items in place, if movement is possible for radiological or other reasons. Undamaged or repairable items will be picked up and accounted for on the stock record accounts of the service concerned.

(d) Cause a Tech Inspection to be made on items exposed to the atomic blast, and prepare a report concerning the post-shot condition of the equipment and material. The report forwarded to the OIG Effects Test for correlation with other data and compilation into one comprehensive report on the effects test.

(4) AFSWP Advisory Group ✓

(a) Provide advice and assistance as required to the Camp Desert Rock staff during the planning and preparatory phases of the exercise.

(b) Deliver explanatory talks to the observers who visit various test positions concerning the effects of the explosion on equipment in the positions.

(c) Assist technical service evaluators in assessing damage to their equipment and material in test positions.

(d) Prepare, from data gained in the test positions and from other sources, a comprehensive final report of the effects test of Exercise Desert Rock III.

(5) S-3 will make a hasty visual inspection of all test positions as quickly after the blast as possible, completing preliminary Damage Assessment Forms (Annex 4) for each position. Completed forms forwarded to representative AFSWP to be used in briefing observers in extent of damage.

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DEPLOYMENT AND EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK III
(Continued)

SECTION II - DETAILED DECONTAMINATION PLAN

(6) Chemical Officer Camp Desert Rock ✓

(a) Insure that film badges are placed according to plan on U-1 (Annex 8 Film Badge Placement Plan): that film badges are collected after U-day and returned in to Film Badge Laboratory AEC O.P.; that film badge report is turned into OIG Effects Test. (Copy to AFSPR Effects Evaluation Group Chief).

(b) Keep OIG Effects Test advised of residual radiation level in test positions, and clear re-entry into shot area, (see Annex 7)

(c) Instruct position monitors to advise tech service evaluators of residual radiation if any, on or in any piece of equipment or material for incorporation in damage assessment reports. (See Annex 7)

(d) Instruct position monitors to give clearance to tech service evaluators, from a radiological contamination standpoint, for movement of items back to camp.

(e) Carry out provisions Decontamination Plan (Annex 10)

(f) Provide monitors to accompany observer group on U-Day

(7) OIG Photography

(a) Coordinate with OIG Effects Test and supervise execution of photographic coverage plan (Annex 9).

(b) Insure that prints of all shots are provided by AEC within reasonable time for inspection by Camp Desert Rock staff members concerned, and that sufficient quantities of prints selected for report purposes are produced.

(c) Upon AEC clearance to revisit the area, instruct all photographic teams who may be required to move from one test position to another to clear with the OIG Effects Test before movement.

(d) Make necessary arrangements in advance with Camp Desert Rock Air Officer for helicopter use when necessary.

(8) OIG Administrative Support

(a) Insure that necessary vehicles for movement to test positions are provided by Camp Desert Rock Transportation Officer, and are assembled for movement in proper order per movement Order # 8 this Headquarters dated 26 1800U Nov 51.

(b) Insure that equipment movement plan from camp to test positions on U-3 and return on U-1 is effected (Annex 6).

(c) Provide an emergency assistance station for operation on U-day at observation position containing ambulance, engineer squad truck, personnel and pioneer tools, medical aid man, and emergency supply of gasoline, oil and water for evaluation team vehicles.

(d) Provide clip boards and tape measures for test evaluation personnel requiring same.

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EMPLACEMENT AND EQUIPMENT TEST PLAN FOR EXERCISE DESERT ROCK III
(Continued)

SECTION II DETAILED IMPLEMENTATION OF PLAN

2. Miscellaneous Details for Damage Evaluation

a. It will be necessary to take measurements, to the nearest foot, to record the displacement distance of equipment or material moved by the explosion. Survey all large test items. Such measurements must be taken upon arrival at test positions for equipment or material that will be administratively moved (vehicles, etc.) in demonstrations for observers.

b. Every effort will be made by all concerned to prevent movement of test items until all observers have passed through the test positions and all measurements and photographs have been taken. However, should an item have to be picked up or moved in any way to accomplish damage assessment it will be replaced in the attitude in which found after the explosion as soon as such damage assessment is completed. Small articles which may have been strewn about by the blast and are in danger of being trampled and further damaged by observer groups will be prominently marked in some suitable fashion to minimize this possibility.

3. Salvage and Equipment Recovery

a. Equipment and material will be moved out of positions 1-7 when damage assessment is completed. However, OIC Effects Test will not permit removal of any item until radiologically cleared for movement by the position monitor. Instructions will be given in each case for disposition of equipment or material not moveable by the OIC Effects Tests.

b. Salvage of emplacement lumber, all sand bags and tactical wire will be commenced by 231 Engr (C) Bn, upon clearance with OIC Effects Test and continued on all available subsequent working days until completed and turned in to camp engineer dump. Emplacement holes will be backfilled and leveled.

c. Equipment and material recovered by tech service will be picked up on appropriate property accounts if serviceable or repairable.

4. Safety Measures

a. Radiological safety (RADSAFE) monitoring on entire test area will be accomplished before evaluation personnel, or any other personnel, are permitted to enter. In addition, one monitor will be continually stationed in each position while evaluation personnel are present. Details of RADSAFE plan are attached as Annex 7.

b. Vehicles speeds on dirt roads will be kept below 15 MPH.
Paved roads - 25 MPH.

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EMPLACEMENT AND EQUIPMENT TEST PLAN FOR NOROISE DESERT ROCK III
(Continued)

SECTION II -- IMPLEMENTATION OF PLAN

c. If for any emergency reason the forward area must be evacuated on U-Day. "Emergency Operation Plan Black" (see movement order # 2 this Hq's dated 26 1800 U Nov 51) will be put into effect. Upon receipt of word that "Condition Black" is in effect, or observation of a red star cluster pyrotechnic signal, OIG's at all positions will assemble all personnel in their position, load them in available vehicles, and proceed directly to Camp Desert Rock. When Decontamination of vehicles becomes necessary, the Decontamination Plan (see Annex 10) will be in effect.

Distribution
Special

OFFICIAL

FITCH
Brig Gen

Smith
S-3

ANNEXES:

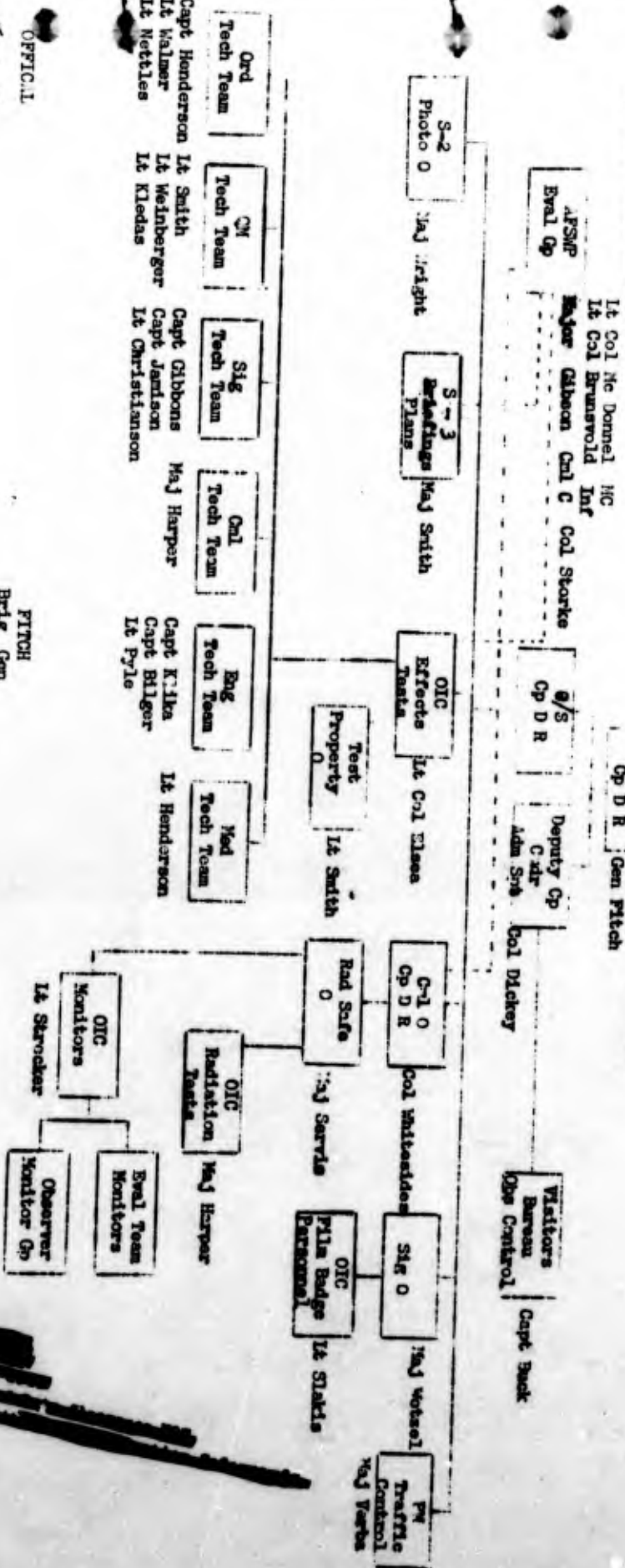
1. Equipment Layout Plan
2. Administrative Relationship Chart
3. Catalogue of Equipment
4. Preliminary Damage Assessment form
5. Final Damage Assessment form
6. Equipment Emplacement Plan
7. Radiological Safety Plan
8. Film Badge Placement Plan
9. Photographic Coverage Plan
10. Decontamination Plan

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Exercise Desert Rock III

ADMINISTRATIVE RELATIONSHIP CHART

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H. C. Fitch
S-3

FITCH
Brig Gen

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HEADQUARTERS

Camp Desert Rock, Las Vegas, Nevada

INDEX 3

26 November 1951

CATALOGUE OF EQUIPMENT AT TEST POSITIONS NUMBERS 1, 2, 3, 4, 5, 6, and 7

DESERT ROCK EXERCISE III

ITEM	PSN 1	PSN 2	PSN 3	PSN 4	PSN 5	PSN 6	PSN 7
Compass lensatic (on dunny)	1A-2	2A-2	3A-2	4A-2	5A-2	6A-2	7A-2
Type "c" rations	1A-3	2A-3	3A-3	4A-3	5A-3	6A-3	7A-3
Type "c" ration(surface)	1A-4	2A-4	3A-4	4A-4	5A-4	6A-4	7A-4
Can, water 5gal (closed under surface)	1A-5	2A-5	3A-5	4A-5	5A-5	6A-5	7A-5
Can, water 5gal (surface & closed)	1A-6	2A-6	3A-6	4A-6	5A-6	6A-6	7A-6
Can, water 5gal (open & under surface)	1A-7	2A-7	3A-7	4A-7	5A-7	6A-7	7A-7
Can, water 5gal (surface, open)	1A-8	2A-8	3A-8	4A-8	5A-8	6A-8	7A-8
Perishable rations (beef)	1A-9	2A-9	3A-9	4A-9	5A-9	6A-9	7A-9
Perishable rations (salt)	1A-10	2A-10	3A-10	4A-10	5A-10	6A-10	7A-10
Perishable rations	1A-11	2A-11	3A-11	4A-11	5A-11	6A-11	7A-11
Perishable	1A-12	2A-12	3A-12	4A-12	5A-12	6A-12	7A-12
Perishable rations	1A-13	2A-13	3A-13	4A-13	5A-13	6A-13	7A-13
Perishable rations	1A-14	2A-14	3A-14	4A-14	5A-14	6A-14	7A-14
30 cal M G w/ mount	1B-1	2B-1	3B-1	4B-1	5B-1	6B-1	7B-1
30 cal M G w/mount (surface)	1B-2	2B-2	3B-2	4B-2	5B-2	6B-2	7B-2
1B-6 Telephone	1C-1✓	2C-1✓	3C-1✓	4C-1✓	5C-1✓	6C-1✓	7C-1✓
SGR-536 (surface)	--	--	--	4C-2✓	--	6C-2✓	--
SGR-536	--	--	--	4C-3✓	--	6C-3✓	--
SGR-300 (surface)	--	--	--	--	5C-2✓	--	7C-2✓
SGR-300	--	--	--	--	5C-3✓	--	7C-3✓
2B-72	--	2C-2✓	--	4C-4✓	--	--	--
1. official wire	--	2C-3✓	3C-2✓	--	5C-4✓	--	--

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APPENDIX 3, Cont.
Catalogue of Equipment

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Dummy in hole with:

Jacket HBT	1D-1	2D-1	3D-1	4D-1	5D-1	6D-1	7D-1
Trousers HBT	1D-2	2D-2	3D-2	4D-2	5D-2	6D-2	7D-2
Helmet w/liners	1D-3	2D-3	3D-3	4D-3	5D-3	6D-3	7D-3
M-1 rifle	1D-4	2D-4	3D-4	4D-4	5D-4	6D-4	7D-4
Gas mask	1D-5	2D-5	3D-5	4D-5	5D-5	6D-5	7D-5
Boots, combat	1D-12	2D-12	3D-12	4D-12	5D-12	6D-12	7D-12

Dummy on surface with:

Jacket HBT	1D-6	2D-6	3D-6	4D-6	5D-6	6D-6	7D-6
Trousers HBT	1D-7	2D-7	3D-7	4D-7	5D-7	6D-7	7D-7
Helmet w/liners	1D-8	2D-8	3D-8	4D-8	5D-8	6D-8	7D-8
M-1 rifle	1D-9	---	3D-9	---	5D-9	---	7D-9
AR 30 cal	---	2D-9	---	4D-9	---	6D-9	---
Gas Mask	1D-10	2D-10	3D-10	4D-10	5D-10	6D-10	7D-10
Boots, combat	1D-13	2D-13	3D-13	4D-13	5D-13	6D-13	7D-13
Tent, shelter (surface)	1D-11	2D-11	3D-11	4D-11	5D-11	6D-11	7D-11
57MM recoilless rifle	1E-1	---	3E-1	---	5E-1	---	7E-1
75 recoilless rifle	---	2E-1	---	4E-1	---	6E-1	---
Sniperscope (surface)	---	---	3E-2	---	---	---	---
Plasma set	1E-3	2E-3	3E-3	4E-3	5E-3	6E-3	7E-3
First Aid pkt	1E-11	2E-11	3E-11	4E-11	5E-11	6E-11	7E-11
Gauze sp, 3"x6, vd	1E-12	2E-12	3E-12	4E-12	5E-12	6E-12	7E-12
Cotton, absorb, open	1E-14	2E-14	3E-14	4E-14	5E-14	6E-14	7E-14
Foot powder	1E-16	2E-16	3E-16	4E-16	5E-16	6E-16	7E-16
Penicillin (procaine)	1E-17	2E-17	3E-17	4E-17	5E-17	6E-17	7E-17
Ampules 100cc calcium Gluconate	1E-19	2E-19	3E-19	4E-19	5E-19	6E-19	7E-19
Ointment tubes, 1% sulfathiazole, 30%	1E-20	2E-20	3E-20	4E-20	5E-20	6E-20	7E-20
1E-1	2E-1	3E-1	4E-1	5E-1	6E-1	7E-1	
1E-2	2E-2	3E-2	4E-2	5E-2	6E-2	7E-2	

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ANNEX 3, Cont
Catalogue of Equipment

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Coil No, 114	1F-3	2F-3	3F-3	4F-3	5F-3	6F-3	7F-3
Coil No, 114 (surface)	1F-4	2F-4	3F-4	4F-4	5F-4	6F-4	7F-4
Coil No, 114	1F-5	2F-5	3F-5	4F-5	5F-5	6F-5	7F-5
Circuit WD-1 wire (surface)	1F-6	2F-6	3F-6	4F-6	5F-6	6F-6	7F-6
Circuit WD-1 wire (air)	1F-12	2F-12	3F-12	4F-12	5F-12	6F-12	7F-12
Circuit WD-1 wire (buried 8")	1F-7	2F-7	3F-7	4F-7	5F-7	6F-7	7F-7
Circuit 110B wire (surface)	1F-8	2F-8	3F-8	4F-8	5F-8	6F-8	7F-8
Circuit 110B wire (air)	1F-13	2F-13	3F-13	4F-13	5F-13	6F-13	7F-13
Circuit 110B wire (buried 8")	1F-9	2F-9	3F-9	4F-9	5F-9	6F-9	7F-9
Circuit sp 4 (old) (surface)	1F-10	2F-10	3F-10	4F-10	5F-10	6F-10	7F-10
Circuit sp 4 (old) (air)	1F-16	2F-16	3F-16	4F-16	5F-16	6F-16	7F-16
Circuit sp 4 (old) (buried 8")	1F-11	2F-11	3F-11	4F-11	5F-11	6F-11	7F-11
Circuit W-143 (surface)	1F-14	2F-14	3F-14	4F-14	5F-14	6F-14	7F-14
Circuit W-143 (air)	1F-17	2F-17	3F-17	4F-17	5F-17	6F-17	7F-17
Circuit W-143 (buried 8")	1F-15	2F-15	3F-15	4F-15	5F-15	6F-15	7F-15
Squad Mont	—	—	30-1	—	50-1	—	—
Bailey Bridges	—	20-1	—	40-1	—	—	—
→ Jeep, (sideways)	—	—	3H-1	4H-1	—	—	7H-1
Tank, M43	—	2I-2	—	4I-1	—	6I-1	—
Tank, M4	—	2I-1	3I-1	—	5I-1	—	—
Tank, M46	—	—	3I-2	—	—	—	—
→ Trk 2 1/2-ton	—	2J-1	3J-1	4J-1	—	—	—
→ Jeep (facing)	1K-1	2K-1	—	—	5K-1	6K-1	—
105MM Howitzer	—	2L-1	—	4L-1	—	—	—
→ Trunk 3/4-ton	—	—	—	4K-1	—	—	—

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HEADQUARTERS

Camp Desert Rock, Las Vegas, Nevada

ANNEA 6

26 November 1951

Equipment Test Plan Exercise
Desert Rock III

EQUIPMENT EMPLACEMENT PLAN

1. Equipment will be moved and installed in site of Desert Rock Exercise III according to following schedule.

a. To be in place ready for test no later than 1600 U-3days.

<u>TECH SERVICE</u>	<u>ITEM</u>	<u>NO.</u>	<u>POSITION</u>
Ordnance	Tank M24	3	2, 3, 5
	Tank M4A3	3	2, 4, 6
	Tank M46	1	3
	105MM Howitzer	2	2, 4
	Trk 2 1/2-ton	3	2, 3, 4
	Trk 1 1/4-ton	3	3, 4, 7
	(sideways)		
	Trk 4-ton(facing)	4	1, 2, 5, 6
	Trk 3/4-ton	1	4
Engineer	Bailey Bridge (20' span)	2	2, 4
	Snatch wire	3	2, 3, 5
Quartermaster	Squad tent	2	3, 5

b. To be in place ready for test no later than 1200 U-1day. (Note: movement may begin 0700 U-1day.)

<u>TECH SERVICE</u>	<u>ITEM</u>	<u>NO.</u>	<u>POSITION</u>
Ordnance	Mach gun .30 cal hvy.	6	1, 2, 3, 4, 5, 6
	Mach gun .30 cal lt.	6	1, 2, 3, 4, 5, 6
	Rifle M-1 .30 cal	11	1, 2, 3, 4, 5, 6, 7
	A M .30 cal	3	2, 4, 6
	57mm recoilless rifle	4	1, 3, 5, 7
	75mm recoilless rifle	3	2, 4, 6
Engineer	Compasses, lensatic (on dummy)	7	1, 2, 3, 4, 5, 6, 7
	Sniperscope	1	3
Chemical	Gas masks (on dummy)	14	1, 2, 3, 4, 5, 6, 7
Medical	Ointment tubes (sulfa-crimel)	7	1, 2, 3, 4, 5, 6, 7
	Flare sets	7	1, 2, 3, 4, 5, 6, 7
	First aid packets	7	1, 2, 3, 4, 5, 6, 7
	Gauze 3"x6yd packet		
	Cotton, absorb open	7	1, 2, 3, 4, 5, 6, 7
	Foot powder, packets	7	1, 2, 3, 4, 5, 6, 7
	Penicillin (procaine)	7	1, 2, 3, 4, 5, 6, 7
	Ampules 10cc colicium gluconate	7	1, 2, 3, 4, 5, 6, 7
Quartermaster	Type "c" ration (cans)	14	1, 2, 3, 4, 5, 6, 7
	Cans, water 5 gal (filled)	28	1, 2, 3, 4, 5, 6, 7
	Beef, chunks	8	2, 3, 5, 7
	Perishable rations		1, 2, 3, 4, 5, 6, 7
	Salt (bags)	14	1, 2, 3, 4, 5, 6, 7
Clothing for Dummies	Knousers, hbt		
	Jacket hbt	14	1, 2, 3, 4, 5, 6, 7
	Helmets, steel w/liner	14	1, 2, 3, 4, 5, 6, 7
	Boots, combat	14	1, 2, 3, 4, 5, 6, 7
	Shelter	7	1, 2, 3, 4, 5, 6, 7

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Annex 6, Cont'n

Equipment Test Plan Exercise Desert Rock III

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TECH SERVICE ITEM

NO. POSITION

Signal	EE8A telephones	14	1, 2, 3, 4, 5, 6, 7
	Coils #114	28	1, 2, 3, 4, 5, 6, 7
	Circuits WD-1 wire	21	1, 2, 3, 4, 5, 6, 7
	Circuits W110B wire	21	1, 2, 3, 4, 5, 6, 7
	Circuits SP4 (old)	21	1, 2, 3, 4, 5, 6, 7
	Circuits W143 wire	21	1, 2, 3, 4, 5, 6, 7
	SCR 536 radio	4	4, 6
	SCR 300 radio	4	5, 7
	Switchboard ED-72	2	2, 4

2. Technical service staff chiefs are responsible for emplacement of property belonging to their particular technical service. However, emplacement of materiel must be coordinated with OIC Effect Test, (Lt Col Carl A. Elsea, Camp Desert Rock Engr. O) and his assistant (1st Lt. Wesley L. Smith OAC, Test property officer).

3. Equipment will be placed according to plan Annex 1.

4. All items when emplaced will be marked with a metal tag (dog-tag) designated by code number. A duplicate of this tag will be pinned to the ground beneath the item. These tags are available on request from OIC Effects Test.

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Camp Desert Rock
Las Vegas, Nevada

ANNEX 9

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26 November 1951

PHOTOGRAPHY COVERAGE PLAN FOR DESERT ROCK, EXERCISE III

1. Following is the plan for photographic coverage of Desert Rock Exercise III:

a. Evaluation and Effects Photography: Six 4 x 5 contact prints each to be made from approximately 1,200 negatives covering military test positions during the two tests at the Nevada Test Site will be required for Effects and Evaluation Reports. This coverage has been coordinated with AEC representatives and will be accomplished by photographers of Graphic Arts Group, Los Alamos Scientific Laboratories, including processing of negatives and prints.

b. Public Information Photography: Prints made from approximately fifty negatives will be required for PIO release during this exercise. Print requirements will vary from three to twenty-five per negative, either 4 x 5 contact prints, or 8 x 10 enlargements. Subjects will be of Camp Desert Rock activities. Subjects should include VIP observers at the forward position. This last requirement is coordinated with AEC representatives.

c. Motion Picture Photography: None is recommended since approximately 30,000 feet of 35 mm motion picture film covering all phases of Camp Desert Rock were exposed by the Signal Corps Photographic Center Special Coverage Unit during Exercise Desert Rock at the time of peak activity.

2. Photographic personnel required to accomplish photography listed in paragraph 1 above:

a. (Refer to paragraph 1a, Evaluation and Effects Photography) All personnel, equipment and supplies to be furnished by Graphic Arts Group, Los Alamos Scientific Laboratories, with the exception of four jeeps to be furnished by Camp Desert Rock during photographic operations.

b. (Refer to paragraph 1b, PIO Photography.) One still cameraman (MOS 3152, attached to Hq. Camp Desert Rock) will be required to accomplish PIO Photography for Camp Desert Rock during Desert Rock Exercise III.

c. Arrangements have been made with Nellis Air Force Base Photo Laboratory to process and print the pictures listed in para 1b, so no laboratory facilities and/or darkroom personnel will be required at Camp Desert Rock.

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Detailed drawings of Tent Emplacements

Refer to Tab II - B, in Part II of
this report. The emplacements were the
same for both exercises.

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29FH 28FH 27FH 26FH

25FH 24FH 23FH

PSN # 7 (3000')

PSN # 6 (2000')

PSN # 5 (1900')

29FHR 28FHR 27FHR 26FHR

25FHR 24FHR 23FHR

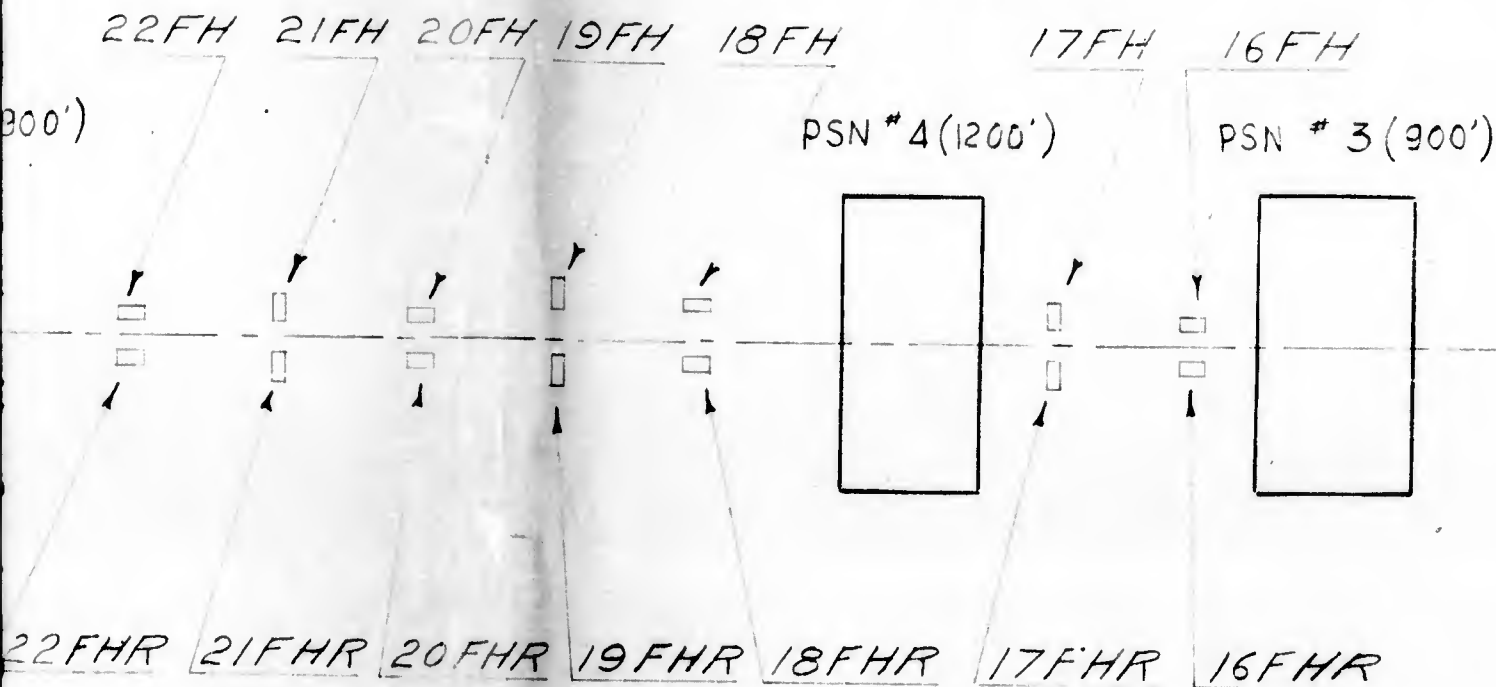
PSN # 7

PSN # 6

Emplacement	Badge Code	Location
OP	7-A-1 to 3	See Typical Layout
MG Empl	7-B-1 to 3	" " "
1 Man Port Empl	7-C-1 to 3	" " "
2 Man Port Empl	7-D-1 to 3	" " "
500 LB RR Empl	7-E-1 to 3	" " "
Spl MG Empl	7-F-1 to 3	" " "
4 ton Truck	7-G-1	Drivers Seat
" " "	7-G-2	Back of Drivers Seat
" " "	7-G-3	On Motor Block

Emplacement	Badge Code	Location
OP	6-A-1 to 3	See Typical Layout
MG Empl	6-B-1 to 3	" " "
1 Man Port Empl	6-C-1 to 3	" " "
2 Man Port Empl	6-D-1 to 3	" " "
500 LB RR Empl	6-E-1 to 3	" " "
Spl MG Empl	6-F-1 to 3	" " "
M43 Tank	6-G-1	Drivers Seat
" " "	6-G-2	Gunnery Seat
" " "	6-G-3	In Turret
4 ton Truck	6-H-1	Drivers Seat
" " "	6-H-2	Back of Driver Seat
" " "	6-H-3	On Motor Block

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PSN #5

PSN #4

Emplacement	Badge Code	Location
2F	5-A-1 to 3	See Typical Layout
MG Empl	5-B-1 to 3	" " "
81 Mort Empl	5-C-1 to 3	" " "
2 Man Foxhole/wc	5-D-1 to 3	" " "
57 & 75 FR Empl	5-E-1 to 3	" " "
Spl MG Empl	5-F-1 to 3	" " "
M-24 Tank	5-G-1	Drivers Seat
" "	5-G-2	Gunnery Seat
" "	5-G-3	In Turret
1 1/2 Ton Truck	5-H-1	Drivers Seat
" "	5-H-2	Back of Drivers Seat
" "	5-H-3	On Motor Block

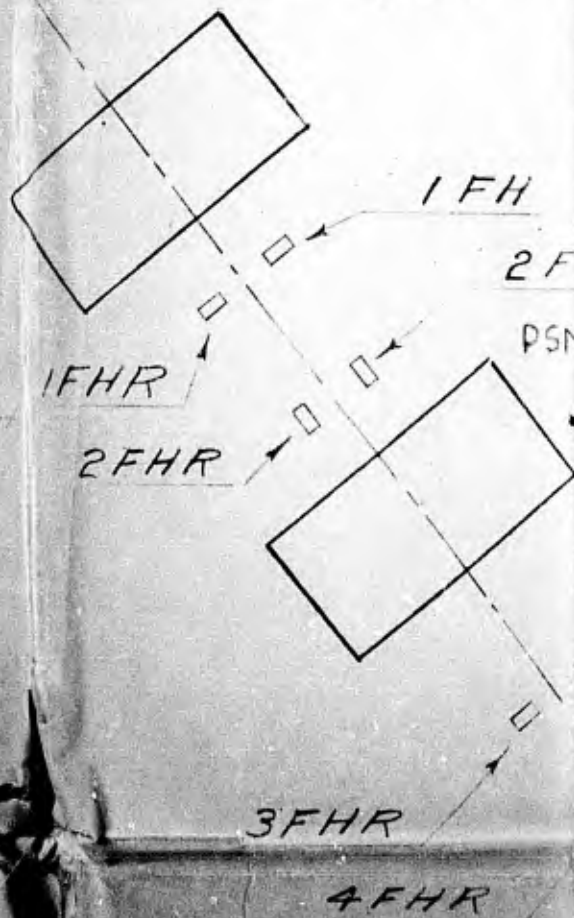
Emplacement	Badge Code	Location
2F	4-A-1 to 3	See Typical
MG Empl	4-B-1 to 3	" " "
81 Mort Empl	4-C-1 to 3	" " "
2 Man Foxhole/wc	4-D-1 to 3	" " "
57 & 75 FR Empl	4-E-1 to 3	" " "
Spl MG Empl	4-F-1 to 3	" " "
3/4 Ton Truck	4-G-1	Drivers Seat
" "	4-G-2	Back of Drivers
" "	4-G-3	On Motor Block
M4A3 Tank	4-H-1	Drivers Seat
" "	4-H-2	Gunnery Seat
" "	4-H-3	In Turret
2 1/2 Ton Truck	4-J-1	Drivers Seat
" "	4-J-2	Back of Drivers
" "	4-J-3	On Motor Block
" "	4-K-1	Drivers Seat
" "	4-K-2	Gunnery Seat
" "	4-K-3	On Motor Block



GROUND ZERO

PSN # 1 (300')

PSN # 3



Location	Emplacement	Badge Code	Location
Typical Layout	OP	3-A-1 to 3	See Typical Layout
"	MG Empl	3-B-1 to 3	"
"	Bl Mort Empl	3-C-1 to 3	"
"	2 Man Foxhole/wc	3-D-1 to 3	"
"	57 & 75 RR Empl	3-E-1 to 3	"
"	Spl MG Empl	3-F-1 to 3	"
Drivers Seat	1/4 Ton Truck	3-G-1	Drivers Seat
Back of Drivers Seat	"	3-G-2	Back of Drivers Seat
Motor Block	"	3-G-3	On Motor Block
Drivers Seat	M46 Tank	3-H-1	Drivers Seat
Gunners Seat	"	3-H-2	Gunners Seat
In Turret	"	3-H-3	In Turret
Drivers Seat	2 1/2 Ton Truck	3-J-1	Drivers Seat
Back of Drivers Seat	"	3-J-2	Back of Drivers Seat
On Motor Block	"	3-J-3	On Motor Block
Drivers Seat	M24 Tank	3-K-1	Drivers Seat
Gunners Seat	"	3-K-2	Gunners Seat
In Turret	"	3-K-3	In Turret

PSN # 2

3

PSN # 1

5 FHR

2 FH

PSN #2 (600')



4

1

Note: All Foxholes Are To Be
Badged According To Typical
Layout

All Film Badges Are To Be
High Intensity Film Badges In
National Bureau of Standards
Film Badge Holders

Note:
layout
ground



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2

1

Cross Section of typical
of film badges in under-
emplacement

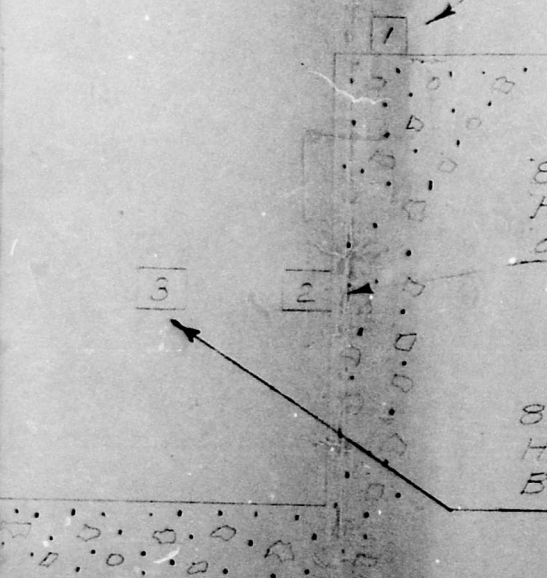
To Ground Zero →

8FHR-1 Film Badge in NBS
Holder Not Shielded

8FHR-2 Film Badge in NBS
Holder 2 Feet From Bottom
of Emplacement on Front Wall

8FHR-3 Film Badge in NBS
Holder on Stake 2 Feet From
Bottom of Emplacement

Emplacement
OP
M3 Empl
81 Mort Empl
2 Mort Empl
5755 RR Empl
Spl M3 Empl
M24 Tank
" "
2 1/2 Ton Truck
" "
7 1/2 Ton Truck
" "
M46 Tank
" "
" "



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[REDACTED]

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6

PSN 2

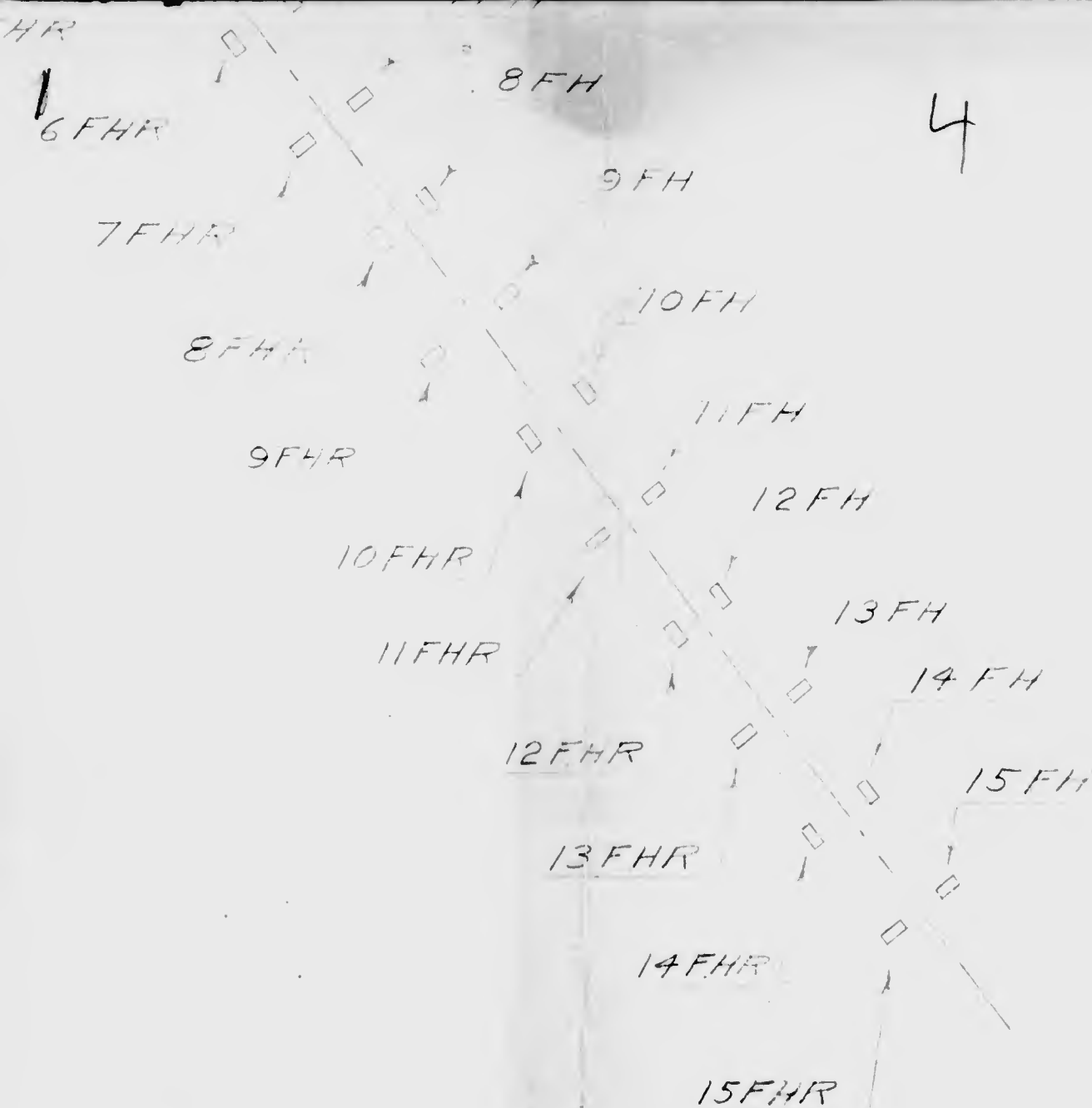
3

PSN 1

Empl	Badge Code	Location
	2-A-1 to 3	See Typical Layout
	2-B-1 to 3	" " "
Empl	2-C-1 to 3	" " "
Empl	2-D-1 to 3	" " "
Empl	2-E-1 to 3	" " "
Empl	2-F-1 to 3	" " "
ank	2-G-1	Drivers Seat
"	2-G-2	Gunnery Seat
"	2-G-3	In Turret
uck	2-H-1	Drivers Seat
"	2-H-2	Back of Drivers Seat
"	2-H-3	On Motor Block
Truck	2-J-1	Drivers Seat
"	2-J-2	Back of Drivers Seat
"	2-J-3	On Motor Block
ank	2-K-1	Drivers Seat
"	2-K-2	Gunnery Seat
"	2-K-3	In Turret

Emplacement	Badge Code	Location
OP	1-A-1 to 3	See Typical Layout
MG Empl	1-B-1 to 3	" " "
31 Mort Empl	1-C-1 to 3	" " "
2 Man Foxhole w/ 1-D-1 to 3	1-D-1 to 3	" " "
57 175 RR Empl	1-E-1 to 3	" " "
Spl MG Empl	1-F-1 to 3	" " "
14 Ton Truck	1-G-1	Drivers Seat
" " "	1-G-2	Back of Drivers Seat
" " "	1-G-3	On Motor Block

7



LAYOUT OF FILM BADGE POSITIONS
EXERCISE DESERT ROCK III
ANNEX 8

S-3 SECTION CAMP DESERT ROCK, NEV.

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by flying debris. It is estimated that 50% casualties would have resulted at Position No. 2 from the blast effect.

(c) Both pair of Foxholes No. 1 and No. 2 between the first two positions were unserviceable and personnel in them would probably have been casualties. The revetted hole of pair No. 3, which was 750 feet from ground zero was undamaged. The unrevetted hole was caved in and not usable. The revetted hole of pair No. 4 was undamaged. The unrevetted hole was about $\frac{1}{2}$ full of dirt and debris. Both holes of pair No. 5 were undamaged. Pair No. 5 was 950 feet from ground zero. The unrevetted holes were unserviceable up to 850 feet and those with revetment were unserviceable up to 600 feet. The fact that some were end on and some were side on seemed to make no difference.

(d) The double apron fence which was 600 feet from ground zero was damaged but would have been about 80% effective against an enemy immediately after the blast. The trip wires near the blast were covered with debris and the posts were bent about 10° from vertical.

g. Summary of Damage to Medical Equipment in Positions No. 1 and 2, Test Desert Rock III.

(1) None of the items in Position No. 1 (300 feet from ground zero) could be found. This was probably due to the thick layer of dust and rocks that covered the entire area.

(2) The items in Position No. 2 (600 feet from ground zero) showed no evidence of damage from burning, and no damage from blast effect. It was again noted that the porous surfaced items were difficult to decontaminate because of infiltration with radioactive particles. Even after dusting the cotton still read 180 MR 53 days after the blast. Well sealed and smooth surfaced containers protected the contents from contamination with radioactive particles and were simple to decontaminate.

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EXEMPTION CODE: 25X(1)

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h. Summary of Damage to Chemical Equipment in Positions No. 1 and 2, Test Desert Rock III.

(1) A final assessment of damages to Chemical Corps equipment in Positions No. 1 and 2 which was subjected to the Atomic Blast in Exercise Desert Rock III was made 23 January 1952 and revealed the following:

(a) One M-3-10A1-6 Gas mask placed on a dummy above the surface of a two-man foxhole at test position No. 1-D (300 feet) showed that one lens was broken, the nose cup pulled away from the face piece, the canister badly dented, the carrier and hose tube torn. This item was beyond repair and would require entire replacement. The gas mask placed below the surface at position No. 1-D was not recovered as the two-man foxhole was caved in covering the gas mask with a depth of four feet of contaminated soil. The gas mask in the above surface position was blown approximately four feet from original position by the blast.

(b) The gas mask placed on a dummy in the above surface position of a two-man foxhole at position No. 2-D (600 feet) revealed the same damage as that of the gas mask recovered from position No. 1-D (300 feet). Again it was impossible to recover the gas mask placed in the below surface position of the two-man foxhole at position No. 2-D due to the cave in and coverage of four feet of contaminated soil.

(2) It was found that equipment placed in this area was a complete loss.

1. Summary of Damage to Signal Equipment in Positions No. 1 and 2, Test Desert Rock III.

(1) None of the items in Position No. 1 (300 feet from ground zero) were found due to the thick layer of dust and rock that covered the entire position. The emplacements were collapsed and filled in, and were not excavated because of the high residual contamination.

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DESCRIPTION OF UNDERGROUND SHOT

The underground shot was a detonation of an implosion type nuclear fission device at 1200 hours Pacific Standard Time on 29 November 1951. The device was buried 17 feet below the surface of underground zero. Preliminary estimates place the yield at 1.1 KT.

To the visual observer, the fireball did not extend above the earth's surface. Thus the flash of intense visible light associated with an air and a surface burst was absent. The earth thrown up did not appear to rise in a vertical column, but instead it formed the shape of an inverted cone whose sides made an angle of between 45° and 60° with the horizontal. Dense dust formed immediately and obscured the view of any additional details.

The dust cloud rose to a height of 7,000 feet above the terrain and appeared to hang over the vicinity of surface zero for one to two hours. Actually the top drifted northeast at about 25 knots and the bottom drifted north by northeast at about 3 knots. The maximum diameter of the cloud was roughly 4,000 yards.

A distinct and unmistakable base surge was not evident. Controversy concerning this exists at the time of this writing, and it will not be resolved until a study of high speed motion picture photographs is made. However, the net effect as far as radiological contamination was concerned was the same as if a base surge had formed.

Miscellaneous data (See Tab II-D)

Crater:

Depth - 100 feet
Diameter - 350 feet
135

Missiles:

Considerable numbers out to 2000 to 3000 feet.

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DESCRIPTION OF UNDERGROUND SHOT (Cont'd.)

29 November 1951:

<u>Time</u>	<u>Altitude (Above U Zero) (feet)</u>	<u>Direction</u>	<u>Speed, Knots</u>	<u>Temperature</u>
0820	Surface	SW	3	
	900	070	3	
	1900	070	3	
	2900	070	3	
	3900	150	5	
	4900	210	14	
	5900	220	21	
	7900	230	23	
1235	Surface			13° C
	900	100	3	10°
	1900	190	8	8°
	2900	210	12	6°
	3900	210	17	5°
	4900	220	22	5°
	5900	220	21	4°
	6900	--	--	2°
	7900	240	25	0°

Surface Pressure at Shot Time - 25.92"

Record of Weather Subsequent to Shot, All Measurements at ABC Command Post

29 November 1951

<u>Time</u>	<u>Surface Winds Direction</u>	<u>Speed, Knots</u>
1230	N	2
1330	SE	6
1430	SE	6
1530	SE	5
1630	S	4
1730	SSW	3
1830	S	4
1930 - 0230	Calm	

30 November 1951

0330	N	5
0430 - 0530	Calm	
0630	NE	3
0730	NW	3
0830 - 1030	Calm	
1130	SW	7
1230	SW	6
1330	SW	10
1430	SSE	5
1530	SSE	5
1630	Calm	
1730	SE	6
1830	SE	3
1930 - 2130	Calm	
2230	SE	3
2330	SE	4

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DESCRIPTION OF UNDERGROUND SHOT (CONT'D.)

1 December 1951

<u>Time</u>	<u>Surface Winds Direction</u>	<u>Speed, Knots</u>
0030	NW	4
0130	NW	3
0230 - 1030	Calm	
1130	SE	4
1230	NE	4
1330	Calm	
1430	SW	16
1530	SW	16
1630	SW	21

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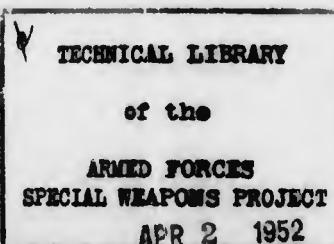
*Letter 6 to Army
Presidio of San Francisco*

AMCT-3 381 (19 Mar 52)19

21 MAR 1952

SUBJECT: Report of Effects on Material and Equipment, Positions
No. 1 and 2, Exercise DESERT ROCK III

TO: Chief
Armed Forces Special Weapons Project
Washington 25, D. C.
ATTN: Major Thomas A. Gibson, Jr.



1. Forwarded herewith is a copy of the Report of Effects on Material and Equipment at Positions No. 1 and 2, Exercise DESERT ROCK III.
2. This report is to be inserted in your copy of Report of Test Exercises Desert Rock II and III, in Section III-E as indicated on inclosures.

FOR THE COMMANDING GENERAL:

2 Incls
1 - Summary of Damage
2 - Description of Damage

CHARLES K. FOX
Lt Col AGC
Asst Adjutant General

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The following information to be inserted in REPORT OF TEST
EXERCISES DESERT ROCK II and III in SECTION III-E, Page 2,
"EFFECTS ON MATERIEL AND EQUIPMENT - UNDERGROUND SHOT"

e. Summary of Damage to Ordnance Equipment in Positions No. 1
and 2, Test Desert Rock III.

(1) Evaluation of equipment in Positions No. 1 and 2 was
made 23 January 1952, 55 days after the Test. Radiation in the area
was from 300 MR to 1000 MR. Readings on all equipment, after removal
from test were over 20 MR. After decontamination, residual radiation
was below 15 MR on all items.

(2) Due to 55 days of exposure to weather, all weapons
were badly rusted and unserviceable, but this cannot be attributed to
effect of the blast. All weapons in Position No. 1, 300 feet from
ground zero, were undamaged. However, mounted weapons were blown over
and buried in heavy layer of sand. Sand was blown into the bores and
mechanisms of all weapons which would have necessitated field stripping
and thorough cleaning before firing. Vehicles on the surface at this
position would be rendered unserviceable, requiring 3d and 4th echelon
repairs. 100% casualties would be expected at this position.

(3) Weapons in Position No. 2, 600 feet from ground zero,
were undamaged by the blast. However, sand was blown into the bores
and mechanisms, necessitating field stripping and cleaning before firing.
Weapons were rusty from exposure. Tanks at this position were undamaged
and were immediately serviceable. Wheeled vehicles were rendered
unserviceable, requiring up to 3d and 4th echelon repairs. Approximately
60% casualties would be expected at this position.

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f. Summary of Damage to Engineer Equipment and Field Fortifications in Positions No. 1 and 2, Test Desert Rock III.

(1) Engineer Equipment.

(a) The Bailey Bridge M2, located 700 feet from ground zero was unserviceable and would require approximately 10 man hours to relay the stringers, ramps, chess, guard rails and walkways. The bridge was side on to the blast. Two walkway sections were split and the hand rail ports were bent on the near side of the bridge. They could be easily straightened.

(b) The luminous markers that were wired to the end posts of the bridge were undamaged.

(c) The Lensatic compass in Position No. 1 was not serviceable but it is assumed that the damage was due to being buried for 53 days in the wet ground and not to the blast effect. The compass at Position No. 2 was undamaged.

(d) The Thermal indicators were constructed by tacking a piece of nylon cloth and a piece of herring-bone twill side by side on a wooden frame. A burn on the nylon would indicate a skin burn and a burn on the herring-bone twill would indicate a clothing burn. This experiment was not a success because those indicators close enough to ground zero to be burned were destroyed or buried by the blast. One $\frac{1}{4}$ " hole was burned in a piece of the nylon at a distance of 800 feet from ground zero. It appeared as if a burning ember had fallen on the cloth.

(2) Field Fortifications.

(a) The six positions at Position No. 1 were completely destroyed and filled with dirt and debris. It is estimated that 100% casualties would have resulted if personnel had been in these positions.

(b) Extensive damage was caused the positions at No. 2 but if personnel had been down low in these positions they would have survived. If they had been standing they probably would have been injured

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(2) The items in Position No. 2 (600 feet from ground zero) showed very little blast effects and no burning or charring.

(a) The only damage attributed to blast was a split case on one KES telephone and damaged diaphragms on both telephones, which was partly due to the heavy rains in the area recently. The telephones could be restored to service by decontamination and replacement of the handsets.

(b) The BD72 switchboard was below the surface of the ground when the blast took place and the top was covered with sand. No damage was noted and with decontamination and a thorough cleaning could be placed back in service.

(c) The C114 loading coils were lying on the surface of the ground and require only cleaning for serviceability.

(d) The above ground wire circuits between emplacements C and F were all down on the ground with the supports broken. The wire looked serviceable but would require checking for continuity and replacement on supports. The underground would only require check.

(e) After 53 days, Position No. 2 had approximately 800 MR residual contamination, but when the items were removed from the area they were easily brought down to 3 or 4 MR by simple brushing.

J. Summary of Damage to Quartermaster Equipment in Positions No. 1 and 2, Test Desert Rock III.

(1) In Test Position No. 1 all tentage was completely destroyed by the blast from the bomb. There was no burning of material detected. The case of rations was moved about 100 feet and damaged considerably. Over 20 MR was detected on the outside of the case. After it was removed 15 MR was detected on the inner cases containing the rations.

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After the rations were removed from the inner case 10 MR was registered on the individual cans of rations. The individual cartons were ruptured and contents registered from 5 to 10 MR and were considered unsafe for use. The cans of rations were all badly bent but none were ruptured. After removing the dust from the cans of rations they registered less than $\frac{1}{2}$ MR and were considered safe for human consumption. The 5 gallon cans of water were highly contaminated, the contents registering over 20 MR, and were not safe for human consumption. The water cans were badly bent and not serviceable. The individual clothing above ground was highly contaminated registering more than 20 MR and not safe for human use. All equipment and clothing placed below the surface of the ground was buried by about four feet of highly contaminated earth and it was not safe to attempt to recover them due to the excessive amount of radiation in the area. Radiation registered up to 500 MR.

(2) In Test Position No. 2 all tentage was completely destroyed by the blast from the bomb. There was no burning of material detected. The case of rations above ground was contaminated and registered over 20 MR after removal of the outer case. The inner case did not register any radiation. The case of rations had not been moved by the blast. All rations in the case are safe for human consumption. The water cans were tipped over and the open cans contents were contaminated and not safe for use. The closed can was contaminated on the outside. After decontaminating the outside of the can the contents registered less than $\frac{1}{2}$ MR and are considered safe for human consumption. The water cans were above ground. The case of rations below the surface and the water cans were partly covered with dirt. They were all contaminated on the outer surface registering over 20 MR. After removal of the outer case from the rations there was no radiation detected. The water in the open can was contaminated and not

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safe to use. After decontaminating the outside of the closed water can the contents were found safe to use, registering less than $\frac{1}{2}$ MR. All rations and water cans were decontaminated by brushing off the dirt in the case of the rations and by washing the outside of the water cans. All clothing above the surface was unsafe due to radiation and not safe to use until decontaminated by washing and airing out over a period of time. All clothing installed below the surface was not recovered, being covered with about three or four feet of highly contaminated dirt, and it was not safe to recover them, the area registering up to 350 MR.

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DESERT ROCK II and III in SECTION III-E, Page 3, under heading
 "Position No. 1 - 100 yards from Ground Zero"

EFFECTS ON MATERIEL AND EQUIPMENT

Position No. 1 - 100 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Ordinance Equipment</u>		
<u>Below Ground</u>		
Rifle, U.S. Cal 30 M1	(1D4)	Item buried not recovered.
Rifle, 57mm M18	(1E1)	Item blown backward and out of revetment. Lens of telescope sight sand blasted and is <u>unservicable</u> .
Gun, Machine Cal 30 M1917A1	(1B1)	Machine gun blown over backward and buried in sand with only tripod legs protruding, hose missing. <u>Servicable</u> after cleaning and replacement of hose.
<u>Above Ground</u>		
Rifle, U.S. Cal 30 M1	(1D9)	<u>Servicable</u> after cleaning.
Gun, Machine Cal 30 M1917A1	(1D9)	Machine gun blown over backward and buried in sand with only tripod legs protruding. <u>Servicable</u> after cleaning.
Truck $\frac{1}{2}$ Ton 4 x 4 C&R	(1K1)	Vehicle was damaged in previous test. The following additional damage was done: Radiator and radiator grill pushed further back; right front fender buckled in. Front wheels out of alignment (Toe out); rear seat broken loose from body; battery caps blown out, gasoline tank bent and seams opened. <u>Unservicable</u> .
<u>Engineer Equipment</u>		
<u>Above Ground</u>		
Thermal Indicator	(1D1)	Not recovered.
Compass, Lensatic	(1D1)	Dial is binding on shaft. <u>Unservicable</u> .

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Item	Code No.	Description of Damage
<u>Signal Equipment</u>		
<u>Above Ground</u>		
Wire WL43	(1-F)	Buried <u>unserviceable</u>
Wire SP4 Old	(1-F)	Buried <u>unserviceable</u>
Wire W110B	(1-F)	Buried <u>unserviceable</u>
Wire WD 1	(1-F)	Buried <u>unserviceable</u>
Wire W114	(1-F)	Buried <u>unserviceable</u>
NOTE: All wire circuits were buried by thick layer of dust and rock. Emplacements were not excavated due to high residual contamination.		
Telephone EE8	(1-C)	Buried <u>unserviceable</u>
<u>Below Ground</u>		
Telephone EE8	(1-F)	Buried <u>unserviceable</u>
Wire WD 1	(1-F)	Buried <u>unserviceable</u>
Wire W110B	(1-F)	Buried <u>unserviceable</u>
Wire SP4 Old	(1-F)	Buried <u>unserviceable</u>
Wire WL43	(1-F)	Buried <u>unserviceable</u>
Wire W114	(1-F)	Buried <u>unserviceable</u>
<u>Chemical Equipment</u>		
<u>Above Ground</u>		
Gas Mask	(1-D)	One lens broken and badly pitted from sand blast, nose cup pulled away from face piece, canister badly dented, carrier torn and hose tube torn. <u>Unserviceable.</u>
<u>Below Ground</u>		
Gas Mask	(1-D)	Item not recovered. Buried by contaminated soil. <u>Unserviceable.</u>

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<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Quartermaster Equipment</u>		
<u>Above Ground</u>		
Tent Shelter	(1FH)	Destroyed by blast. <u>Unserviceable.</u>
Trousers HBT	(1FH)	Undamaged except for intense radiation. <u>Unserviceable.</u>
Jacket HBT	(1FH)	Excessive radiation. <u>Unserviceable.</u>
Boots Combat	(1FH)	No damage except excessive radiation. <u>Unserviceable.</u>
Helmet Steel M1 w/liner	(1FH)	No damage except excessive radiation. <u>Unserviceable.</u>
Rations Type "C" Case	(1-A)	Case badly torn up, individual cans bent, but not ruptured. Safe for human consumption except for cigarettes, coffee, sugar.
Can, Water 5 gal w/water (Closed)	(1-A)	Water can was badly caved in and bent. <u>Unserviceable.</u> The water was still intact but contaminated and unsafe for human consumption.
Can, Water 5 gal w/water (Open)	(1-A)	Water can was badly bent and <u>unserviceable.</u> Water had spilled out.
<u>Below Ground</u>		
Trousers HBT	(1FH)	Item was buried, not recovered.
Jacket HBT	(1FH)	Item was buried, not recovered.
Boots Combat	(1FH)	Item was buried, not recovered.
Helmet Steel M1 w/liner	(1-A)	Item was buried, not recovered.
Rations Type "C" Case	(1-A)	Item was buried, not recovered.
Can, Water 5 gal w/water (Closed)	(1-A)	Item was buried, not recovered.
Can, Water 5 gal w/water (Open)	(1-A)	Item was buried, not recovered.

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<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Medical Equipment</u>		
<u>Above Ground</u>		
Tube, Ointment	(1-E)	Item not recovered.
Ampule, Ca Gluconate	(1-E)	Item not recovered.
Penicillium	(1-E)	Item not recovered.
Foot Powder	(1-E)	Item not recovered.
Cotton, Absorbent(Open)	(1-E)	Item not recovered.
First Aid Packet	(1-E)	Item not recovered.
Plasma Set Box	(1-E)	Item not recovered.
Gauze packet (3" 6 Yds)	(1-E)	Item not recovered.

The following information to be inserted in REPORT OF TEST EXERCISES
DESERT ROCK II and III in SECTION III-E, Page 3, under heading
"Position No. 2 - 200 yards from Ground Zero"

EFFECTS ON MATERIEL AND EQUIPMENT

Position No. 2 - 200 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Ordinance Equipment</u>		
<u>Above Ground</u>		
Rifle, Auto, Cal 30 M1918A4	(2D9)	<u>Serviceable</u> after cleaning.
Gun, Machine Cal 30 M1919A5	(2B2)	<u>Serviceable</u> after cleaning.
Movitsar, 105mm M2A1	(2L1)	Sights were not mounted. No evidence of charring or burning. <u>Serviceable</u> after cleaning.

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<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Ordnance Equipment</u>		
<u>Above Ground</u>		
✓ Truck $\frac{1}{2}$ Ton 4 x 4 G&R	(2K1)	Windshield clamps broken, windshield frame broken loose on left side and windshield blown back over steering wheel, bending steering column in horizontal position. Hood clamps broken, front wheels slightly out of alignment (toe out). Vehicle driven from site. <u>Unserviceable.</u>
✓ Truck, $2\frac{1}{2}$ Ton 6 x 6 GMC Cargo	(2J1)	Truck moved sideways 12 inches. Hood blown off; left door of cab which was toward the blast badly bent in, glass shattered, glass frame bent in; windshield glass blown out; glass in rear of cab blown out; left front fender bent and running board broken loose; right door of cab blown open, glass shattered and frame bent out; seat cushion blown out of right door. Fuel tank and fuel intact. <u>Unserviceable.</u>
Tank Light M-24	(2I1)	No damage 75mm gun, 50 Cal and 30 Cal <u>serviceable</u> after cleaning.
Tank Medium M4A3	(2I2)	No damage, weapons <u>serviceable</u> after cleaning.
<u>Below Ground</u>		
Gun, Machine, Cal 30 M1917A1	(2B1)	Hose broken. Weapon could be fired after cleaning and replacement of hose.
Rifle 75mm M20	(2B1)	No telescope was mounted on weapon. No damage.
Rifle, U.S. Cal 30 M1	(2B4)	No damage. <u>Serviceable</u> after cleaning.

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Item	Code No.	Description of Damage
<u>Engineer Equipment</u>		
<u>Above Ground</u>		
4 ea Marker, Luminous	(2)	No damage. <u>Serviceable.</u>
Bridge, Bailey	(2)	All except four stringers, ramps, chess, guard rails and walkways would have to be relayed to make bridge serviceable. Bridge was moved 12" by the blast.
Double Apron Fence	(2)	Posts bent 10° from vertical. Debris covered trip wires next to blast. <u>Inserviceable.</u>
Compass, Lensatic	(2-D)	No damage. <u>Serviceable.</u>
<u>Signal Equipment</u>		
<u>Above Ground</u>		
Coil C114	(2-C)	No damage. <u>Serviceable.</u>
Wire W143	(2-F)	No damage. <u>Serviceable.</u>
Wire SP4 Old	(2-F)	No damage. <u>Serviceable.</u>
Wire W110B	(2-F)	No damage. <u>Serviceable.</u>
Wire WD 1	(2-F)	No damage. <u>Serviceable.</u>
Coil C114 Wire W114	(2-F)	Item not recovered.
<u>Below Ground</u>		
Switchboard BD72	(2-C)	No damage. Sand in drop cord and chest set compartments. <u>Serviceable.</u>
Telephone FE8	(2-F)	No damage. <u>Serviceable.</u>
Coil C114 Wire W114	(2-F)	Item not recovered.
Wire WD1	(2-F)	No damage. <u>Serviceable.</u>
Wire W110B	(2-F)	No damage. <u>Serviceable.</u>
Wire SP4	(2-F)	No damage. <u>Serviceable.</u>

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Item	Code No.	Description of Damage
<u>Signal Equipment</u>		
<u>Below Ground</u>		
Wire WL43	(2-F)	No damage. <u>Serviceable.</u>
Telephone KE8	(2-C)	Case split at handset pocket. Earphone and microphone diaphragms badly distorted and packed with sand. <u>Unserviceable.</u>
<u>Chemical Equipment</u>		
<u>Above Ground</u>		
Gas Mask	(2-D)	One lens broken and badly pitted from sand blast. Nose cup pulled away from face piece, canister badly dented. Carrier and hose tube torn. <u>Unserviceable.</u>
<u>Below Ground</u>		
Gas Mask	(2-D)	Item buried by blast not recovered.
<u>Quartermaster Equipment</u>		
<u>Above Ground</u>		
Can, Water 5 Gal w/water (Closed)	(2-A)	No damage. Contents fit for human consumption. <u>Serviceable.</u>
Can, Water 5 Gal w/water (Open)	(2-A)	No damage. Contents unfit for human consumption. <u>Serviceable.</u>
Boots, Combat	(2FH)	No damage except excessive radiation. <u>Unserviceable.</u>
Helmet, Steel	(2FH)	No damage except excessive radiation. <u>Unserviceable.</u>
Jacket, HBT	(2FH)	No damage except excessive radiation. <u>Unserviceable.</u>
Ration, Type C (Case)	(2-A)	No damage. Contents fit for human consumption.
Tent, Shelter	(2-A)	Destroyed by blast.
Trousers, HBT	(2FH)	No damage except excessive radiation. <u>Unserviceable.</u>

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<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Quartermaster Equipment</u>		
<u>Below Ground</u>		
Boots, Combat	(2-F)	Item buried, not recovered.
Can, Water 5 Gal w/water (Closed)	(2-A)	No damage. Contents fit for human consumption.
Can, Water 5 Gal w/water (Open)	(2-A)	No damage. Contents unfit for human consumption.
Helmet, Steel w/liner	(2FH)	Item buried, not recovered.
Jacket HBT	(2FH)	Item buried, not recovered.
Rations, Type C (Case)	(2-A)	No damage. Contents fit for human consumption.
Trousers HBT	(2FH)	Item buried, not recovered.
<u>Medical Equipment</u>		
<u>Above Ground</u>		
Ca Gluconate (Ampule)	(2-E)	Item could not be found.
Cotton, Absorbent (Open)	(2-E)	<u>Unserviceable</u> due to infiltration of radiated dust.
First Aid Packet	(2-E)	No damage. <u>Serviceable</u> .
Gause Packet (3" x 6 Yds)	(2-E)	Packet torn. <u>Unserviceable</u> .
Ointment Tube 15% Sulfathiazole 30% Calomel	(2-E)	No damage. <u>Serviceable</u> .
Foot Powder, Cellophane Pkt	(2-E)	Item could not be found.
Penicillin (Procaine) Bottle 10cc	(2-E)	No damage. <u>Serviceable</u> .
Plasma Set Box	(2-E)	Box showed evidence of damage from burning. Lid was off and box torn. <u>Unserviceable</u> .

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EFFECTS ON MATERIEL AND EQUIPMENT - UNDERGROUND SHOT

The following tabulation describes the effects of the underground explosion on the materiel and equipment which was exposed in the various test positions.

The original copies of the detailed damage assessment forms are attached to Copy 1 of this report and can be used for more detailed reference to specific damage to individual items if desired.

The distinction of serviceable and unserviceable refers to whether or not the item was immediately combat serviceable after the explosion and gives an indication as to the loss of immediate effectiveness of a unit from the standpoint of equipment and materiel.

The code number shown in the tabulation refers to the code number assigned to the particular item in the detailed test plan (Tab III-A). This code number can be used to identify the particular item with the photographs showing the damage (Tab III-G).

It will be noted that the damage to test items in Positions 1 and 2 was not completely appraised. Residual radiations prevented detailed damage assessment by evaluations in these positions. Other items, not reported on, were buried in collapsed emplacements.

All weapons, which were not obviously damaged to an extent that would prevent it, were test-fired as an additional check of their combat serviceability.

A hasty visual assessment of damage to the equipment and fortifications of the NE line (Positions 1 and 2) revealed the following:

- a. Revetted and unrevetted foxholes at FHP Nos. 1 and 2, were caved in. Unrevetted foxholes in FHP Nos. 3, 4, 5, 6 and 7 were caved in but revetted foxholes held up under the blast. Remaining foxholes remained undamaged.
- b. In test Position No. 1 (100 yards) all positions were caved in and most of the test items buried. One case of "C" rations was blown about 20 yards to the rear. The 1/4-ton truck was damaged beyond repair. The tires remained intact but the body and front were badly twisted. At D + 4 days the residual radiation level was ~~0.05 R/hr~~

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EFFECTS ON MATERIEL AND EQUIPMENT - UNDERGROUND SHOT (Continued)

c. In Test Position No. 2 (200 yards), the windshield of the 1/4-ton truck, which had been fastened to the hood, was torn loose, pushed to its normal position and then bent on back to a point where the steering wheel was pushed through the glass. The steering column was bent down to a point where the steering wheel was resting on the driver's seat. The jeep had been moved to the rear one foot. The motor, radiator, and remainder of the jeep apparently sustained no damage. The Bailey bridge was moved six inches on its base and the flooring and walkways were dislodged. Of the two tanks in this position, an M4A3 and an M-24, only the M-24 showed any damage. An open hatch was twisted slightly on its hinges. The 105 mm Howitzer was undamaged. A cab-type 2 1/2-ton truck had the engine hood blown up and badly twisted; the left front fender was torn loose and twisted; all cab and door glass was broken, and the left front door blown in about six inches. All bows were broken in the rear. The fortifications, all revetted, suffered only slight cave-ins and the small weapons appeared undamaged. Tactical wire was loosened and telephone wire blown down. At D + 4 days, the radiation level was 10 r/hr.

d. A thick dust covered all test items in Positions 1 and 2. Gas masks had to be worn to prevent the breathing of the contaminated dust by the evaluators.

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EFFECTS ON MATERIEL AND EQUIPMENT

Position No. 1 - 100 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
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To be assessed later

Position No. 2 - 200 yards from Ground Zero

To be assessed later

Position No. 3 - 300 yards from Ground Zero

Ordance

Above Ground

✓ Truck $\frac{1}{2}$ Ton 4 x 4 C&R	(3H-1)	Hood catches broken off. Windshield pushed down over steering wheel, glass broken left side, hood damaged. <u>Serviceable</u>
✓ 1 Truck $2\frac{1}{2}$ Ton Cargo	(3J-1)	Cargo body pushed in 4" Bow socket twisted, left windshield blown out. Right engine side pannel broken, hood loose and damaged. <u>Serviceable</u>
Tank M46	(3I-2)	No damage test fired.
Tank M24	(3I-1)	No damage test fired.
57mm Recoiless Rifle	(3E-1)	No damage.
Rifle Cal 30 M-1	(3D-9)	No damage.
MG M1919A6	(3B-1)	No damage.
MG M1917A1	(3B-2)	No damage.

Below Ground

Rifle Cal 30 M-1	(3D-4)	No damage.
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Engineer Equipment

Above Ground

Sniperscope	(3E-2)	Batteries cracked, Burned spots on viewing screen Dim image - <u>Unserviceable</u>
Lensatic Compass	(3A-2)	No damage.
Double Apron Wire	(3C-2)	Wire stretched - <u>Serviceable</u>

Signal Equipment

In the Air

Wire Circuits

Blown from poles - Serviceable

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Effects on Materiel and Equipment (cont'd)

Position No. 3 - 300 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Signal Equipment</u>		
<u>Above Ground</u>		
Wire Circuits		No damage
EE6 TP	(3C-1)	<u>Moved 5'</u> Batteries loosened <u>Serviceable</u>
Loading Coils	(3F-4)	No damage
<u>Below Ground</u>		
Wire Circuits		No damage
EE8 TP	(3F-1)	No damage
<u>Quarter Masters</u>		
<u>Above Ground</u>		
Jacket HBT	(3D-6)	No damage
Trousers HBT	(3D-7)	No damage
Helmet, steel	(3D-8)	<u>Moved 10'</u> <u>Serviceable</u>
Boots, combat	(3D-13)	No damage
Tent, shelters	(3D-11)	Apparently burned, 18" sq. piece only located. <u>Destroyed</u>
Tent Squad	(3G-1)	Tent torn and pieces scattered over area 40' x 100' <u>Unserviceable</u>
<u>Below Ground</u>		
Jacket HBT	(3D-1)	Not recovered
Trousers HBT	(3D-2)	Not recovered
Helmet, steel	(3D-3)	Not recovered
Boots, combat	(3D-12)	Not recovered
<u>Medical Equipment</u>		
<u>Above Ground</u>		
Ointment tube	(3E-20)	No damage
Ca Gluconate Ampule	(3E-19)	No damage
Penicillium	(3E-17)	No damage
Foot Powder	(3E-16)	No damage

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Effects on Materiel and Equipment (cont'd)

Position No. 3 - 300 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Medical Equipment</u>		
<u>Above Ground</u>		
Cotton, open	(3E-14)	Permeated with Atomic Dust <u>Unserviceable</u>
Gause Pkt	(3E-12)	No damage
First Aid Pkt	(3 E-11)	No damage
Plasma Set	(3E-3)	Moved 7' <u>Serviceable</u>

Position No. 4 - 400 yards from Ground Zero

Ordance Equipment

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Above Ground</u>		
✓ Truck, 2½ Ton Cargo	(4J-1)	<u>Moved sideways 1'</u> . Hood ripped open, engine compart- ment side panel bent inward, tarp torn, bows broken. <u>Serviceable</u>
✓ Truck, 3/4 Ton 4 x 4 WC	(4K-1)	<u>Moved 6" sideways</u> , hood torn off, windshield broken, tarp torn off and bows broken. <u>Serviceable</u>
✓ Truck, ¼ Ton 4 x 4 C&R	(4H-1)	<u>Moved 6"</u> , Windshield cracked. <u>Serviceable</u>
Tank, M4A3	(4I-1)	Spot light torn off. Weapon test fired U / 9 days. <u>Serviceable</u>
105mm How.	(4L-1)	<u>Moved 6"</u> , Test fired U / 9 day. <u>Serviceable</u>
75mm Recoiless Rifle	(4E-1)	<u>Knocked over</u> no damage test fired U / 9 days. <u>Serviceable</u>
Machine Gun M1917A1	(4B-1)	No damage. Test fired U / 9 <u>Serviceable</u>
Machine Gun M1919A6	(4B-2)	No damage. Test fired U / 9 <u>Serviceable</u>
Automatic Rifle Cal 30	(4D-9)	No damage. Test fired U / 9 <u>Serviceable</u>
<u>Below Ground</u>		
Rifle M-1 Cal 30	(4D-9)	No damage. Test fired U / 9 <u>Serviceable</u>

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Effects on Materiel and Equipment (cont'd)

Position No. 4 - 400 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Engineer Equipment</u>		
<u>Above Ground</u>		
Bailly Bridge	(4G-1)	Moved 4" on bearing plates <u>Serviceable</u>
Other Item		No Damage
<u>Signal Equipment</u>		No Damage
<u>Chemical Equipment</u>		No Damage
<u>Porter Master Equipment</u>		
<u>Above Ground</u>		
Salt	(4A-10)	Sack container broke <u>Unserviceable</u>
Jacket HBT	(4D-6)	Moved 1' <u>Serviceable</u>
Trousers HBT	(4D-7)	Moved 2' <u>Serviceable</u>
Helmet, steel		Moved 10' <u>Serviceable</u>
Tent, Shelter	(4D-11)	Moved 20' Torn and ripped <u>Unserviceable</u>
Boots, combat	(4D-12)	Moved 1' <u>Serviceable</u>
<u>Below Ground</u>		
Salt	(4A-10)	Sack broken - not recovered
Other Items		No damage
<u>Medical Equipment</u>		
<u>Above Ground</u>		
Ca Gluconate (Ampule)	(4E-19)	Tip of ampule broken off <u>Unserviceable</u>
Other Items		No damage

Position No. 5 - 633 yards from Ground Zero

<u>Ordnance Equipment</u>		No damage - weapons test fired
<u>Engineer Equipment</u>		No damage
<u>Signal Equipment</u>		
<u>Below Ground</u>		
SCR 300 Radio	(5C-3)	Antenna bent. <u>Serviceable</u>
Other Items		No damage

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Effects on Materiel and Equipment (cont'd)

Position No. 5 - 633 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Chemical Equipment</u>		No Damage
<u>Quarter Master Equipment</u>		
<u>Above Ground</u>		
Tent, shelter	(5D-11)	Knocked down - torn & ripped <u>Unserviceable</u>
Tent, squad	(5C-1)	Upright broken - torn length of ridge pole - other rips <u>Unserviceable</u>
Other Items		No damage
<u>Medical Equipment</u>		
<u>Above Ground</u>		
Plasma Set	(5E-3)	Box cracked - contents contaminated - <u>Serviceable</u>
Other Items		No damage

Position No. 6 - 800 yards from Ground Zero

<u>Ordance Equipment</u>		No damage - weapons test fired
<u>Engineer Equipment</u>		No damage
<u>Signal Equipment</u>		No damage
<u>Chemical Equipment</u>		No damage
<u>Quarter Master</u>		
<u>Above Ground</u>		
Tent, shelter	(6D-11)	Collapsed - <u>Serviceable</u>
Other Items		No damage
<u>Medical Equipment</u>		No damage

Position No. 7 - 1000 yards from Ground Zero

<u>Ordance Equipment</u>		No damage - Weapons test fired
<u>Engineer Equipment</u>		No damage
<u>Signal Equipment</u>		No damage
<u>Chemical Equipment</u>		No damage

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Effects on Material and Equipment (cont'd)

Position No. 7 - 1000 yards from Ground Zero

<u>Item</u>	<u>Code No.</u>	<u>Description of Damage</u>
<u>Quarter Master</u>		
<u>Above Ground</u>		
Tent, shelter	(7D-11)	Collapsed - pole broken <u>Serviceable</u>
Other Items		No damage
Medical Equipment		No damage

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Effects on Emplacements

U - Shot

In the following tabulation only that damage which was sufficient to result in causing the occupant to become a casualty was considered.

FH - 2 man foxhole w/o cover

X - Damage sufficient to cause injury to occupants.

NA - No positions of this type in test

O - Negligible damage.

Type Position	Position Number	Distance (yds) from G1Z4	Revettted	Unrevettted
O.P.	1A	100	X	NA
M.G. Empl.	1B	100	X	NA
81 mm Empl.	1E	100	X	NA
2 man FH w/cover	1D	117	X	NA
RR Empl.	1E	117	X	NA
Sp. M.G. Empl.	1F	117	X	NA
FH	1FH	150	X	X
FH	2FH	183	X	X
O.P.	2A	200	X	NA
M.G. Empl.	2B	200	O	NA
81 mm Empl.	2C	200	O	NA
FH w/cover	2D	214	O	NA
RR Empl.	2E	214	X	NA
Sp. M.G. Empl.	2F	214	O	NA
FH	3FH	266	X	X
FH	4FH	300	O	X
O.P.	3A	300	O	NA
M.G. Empl.	3B	300	O	NA
81 mm Empl.	3C	300	O	NA
2 man FH w/cover	3D	313	X	NA
RR Empl.	3E	313	O	NA
Sp. M.G. Empl.	3F	313	O	NA
FH	5FH	333	O	X
FH	16FH	347	O	X
FH	6FH	366	O	X
FH	17FH	385	O	X
FH	7FH	400	O	X
O.P.	4A	400	X	NA
M.G. Empl.	4B	400	O	NA
81 mm Empl.	4C	400	O	NA
2 man FH w/cover	4D	412	X	NA
RR Empl.	4E	412	O	NA
Sp. M.G. Empl.	4F	412	O	NA
FH	8FH	433	O	X
FH	9FH	466	O	O
FH	18 FH	466	O	O
FH	10FH	500	O	O
FH	19FH	500	O	X
FH	11FH	533	O	O
FH	20FH	533	O	X
FH	12FH	566	O	O
FH	21FH	566	O	X
FH	13FH	600	O	O
FH	22FH	600	O	O
FH	14FH	633	O	O

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Effects on Emplacements - Surface Shot

U - Shot

(cont'd)

<u>Type</u> <u>Position</u>	<u>Position</u> <u>Number</u>	<u>Distance (yds)</u> <u>from G.Z.</u>	<u>Revettted</u>	<u>Unrevettted</u>
O.P.	5A	633	0	NA
M.G. Empl.	5B	633	0	NA
81 mm Empl.	5C	633	0	NA
FH w/cover	5D	645	0	NA
RR Empl.	5E	645	0	NA
Sp. M.G. Empl.	5F	645	0	NA
FH	15FH	666	0	0
FH	23FH	700	0	0
FH	24FH	733	0	0
FH	25FH	766	0	0
O.P.	6A	800	0	NA
M.G. Empl.	6B	800	0	NA
81 mm Empl.	6C	800	0	NA
FH w/cover	6D	812	0	NA
RR Empl.	6E	812	0	NA
Sp. M.G. Empl.	6F	812	0	NA
FH	26FH	866	0	0
FH	27FH	900	0	0
FH	28FH	933	0	0
FH	29FH	966	0	0
O.P.	7A	1000	0	NA
M.G. Empl.	7B	1000	0	NA
81 mm Empl.	7C	1000	0	NA
FH w/cover	7D	1012	0	NA
RR Empl.	7E	1012	0	NA
Sp. M.G. Empl.	7F	1012	0	NA

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Photographs of Emplacements & Equipment

Photographs (before and after) of equipment and emplacements
to be added in this section when available.

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FILM BADGE RESULTS

Desert Rock III

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The method of preparation of the graphs showing the gamma dose during the first 30 minutes in the open and in foxholes and emplacements was the same as that used after Desert Rock II. (Tab II-H). A total of 354 National Bureau of Standard holders loaded with Eastman #5302 and Eastman "Double Coat" were exposed. Of these, 288 or 81% were recovered. The Evans Signal Laboratory unit at the test site calibrated, developed and read the film.

not pens dosimeters

The dosage on the film due to residual radiation from H + 30 minutes until the film was recovered was calculated. This amount was subtracted from the total. The result gave the dosage during the first 30 minutes following the explosion. Thirty minutes was chosen because the radioactive ground cloud moved 3,000 yards during this time and had thus moved away from Desert Rock III positions after approximately 30 minutes.

The two lines of Desert Rock positions (NE and S) were reported separately for two reasons. First, the NE line was under the cloud for a longer time and received more initial radiation; and, second, the film from foxholes only could be recovered from the NE line because most of the emplacements had caved in. Also, the residual radiation at the time of recovery (H + 5 days) was too high to allow the recovery party time to crawl into the emplacements of the NE line. If recovery had been made at a later day, a prohibitive number of the film would have been above the upper dose limit of the film (10,000 r). As it was, 35 of the recovered film were over-exposed and many more were near the upper limit.

One would expect emplacements with overhead cover to give more protection from a radioactive cloud passing over than those emplacements without. The data from the South positions was examined for this effect, but the readings were too scattered and too erratic to detect the effect even if present.

When recovering the film holders, readings of the dose rate due to the residual radiation both in the open at, and in each foxhole and emplacement were made. The average protection afforded by the foxholes and emplacements against a residual radiation field [REDACTED]

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FILM BADGE RESULTS (Cont'd.)

The curve showing dosage during the first 30 minutes vs. distance for the NE line of positions represents the average of revetted and unrevetted foxholes oriented end-on and side-on toward zero point. The orientation of the foxholes did not have a detectable effect on the dosage received. However, whether a foxhole was revetted or not had a definite effect. The unrevetted holes were wider and received more of the radiation down into the hole from the passing cloud. See Table below:

"U" SHOT - NORTHEAST LINE
 (all dosages in roentgens)

<u>Distance from Zero (yards)</u>	<u>Dose in Open</u>	<u>Dose in Revetted Foxhole</u>	<u>% Protection</u>	<u>Dose in Unrevetted Foxhole</u>	<u>% Protection</u>
400	10,000	2,400	76	5,300	47
500	6,500	1,000	85	2,000	67
600	3,300	280	92	500	85
650	1,900	140	93	230	88

It should be noted that the per cent protection varies markedly with distance from zero point. This was not true following the surface shot.

A suitable working rule for the protection afforded by a foxhole from the radiation of a passing ground cloud is 75%.

The following table shows the protection afforded by the average emplacement along the south line of positions.

<u>Distance from Zero (yards)</u>	<u>Dosage in Roentgens</u>		
	<u>In Open</u>	<u>In Average Emplacement</u>	<u>% Protection</u>
450	7,000	1,400	80
500	4,000	760	81
600	1,800	220	88
700	840	64	92
800	400	10	97

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FILM BADGE RESULTS (Cont'd.)

The following table shows the area covered by the residual radioactive contamination on the ground following the underground shot.

<u>Dose Rate</u> <u>H + 1 Hr.</u>	<u>Area</u> <u>(sq.mi.)</u>
50 r/hr. or greater	Very large
100 r/hr. or greater	2.1
300 r/hr. or greater	0.34
500 r/hr. or greater	0.2
1000 r/hr. or greater	0.08

The film badge data from tanks was very limited in that film from only four tanks was recovered. The table below shows a comparison of the dosage in 30 minutes in the tanks for which data was available, and in the average emplacement:

<u>Distance from Zero</u> <u>(yards)</u>	<u>Tank Type</u>	<u>Dose in r in Tank</u>	<u>Dose in r</u> <u>Average Emplacement</u>
233	M-46	8,900*	> 10,000
417	M4A3	275	600
651	M-24	150	120
818	M4A3	30	< 10

* Tank was "hull down". Others were on surface.

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EFFECTS ON FOOD AND WATER

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Desert Rock III

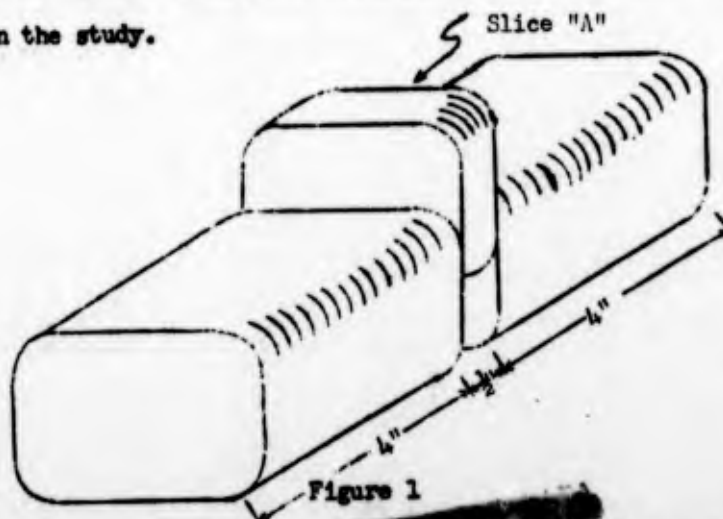
Since the neutrons from the underground burst were absorbed in the earth, there was no neutron induced radioactivity in the exposed food and water. As in the surface shot, the radioactive dust did not contaminate the water in a closed water can or the food in an intact "C" ration box.

Meat (beef) exposed bare was recovered from Positions 3, 5 and 7. In this test, large massive pieces of meat were exposed so that the penetration of the contamination into the meat could be examined. The meat was recovered on D + 7 days. The weather had been cold, and the meat did not spoil and only the outer layer had dried out.

The meat was prepared for examination by technical personnel from the National Institute of Health, Washington, D. C. present at the test site. The counting was done in their counting laboratory on D + 8 days. The calculations were made by AFSWP personnel attached to Camp Desert Rock. The meat was not washed or cleaned in any way, and it was examined as described below:

Meat Contamination Study

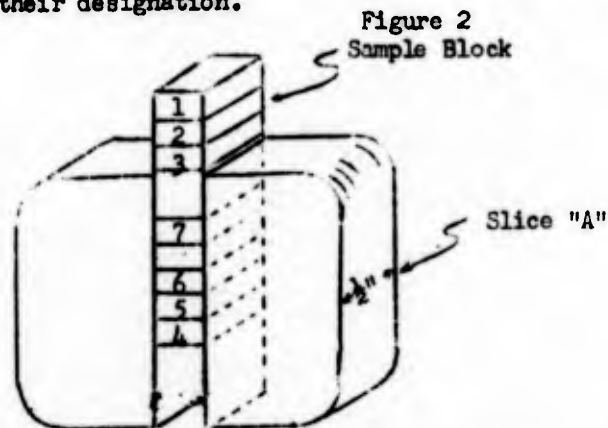
Each piece of meat was sectioned at four (4) inches from the end in order to avoid possible endwise contamination, care having been taken to avoid cross contamination between the various pieces and between the parts of the same piece. Figure 1 gives a schematic representation of the pieces of meat which were used in the study.



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Figure 2 represents a slice of the meat A, above, and shows the portions presented in Table 1 and their designation.



Sample blocks 1 through 3, and 4 through 6 were taken in such a way that the centers of the blocks were separated by a distance of approximately $1/4$ " and $1/2$ " so that the meat was sampled virtually to a depth of $3/4$ " from one side (1-3) and $1-1/2$ " on the other side (4-6). Blocks No. 7 were derived from the center of each slice.

Table 1
Depth of Penetration of Contamination in Samples of Meat Exposed

Meat Sample Number	Tissue Block Numbers	Crucible No.	Weight Wet Tissue* (grams)	Curies	curies/grams	Planchet No.
7A-11 7A-9A A-2 1000 yards from Zero	1	40	1.11	2.7×10^{-9}	2.5×10^{-9}	272
	2	48	0.97	4.2×10^{-11}	4.3×10^{-11}	217
	3	25	0.84	3.9×10^{-11}	4.6×10^{-11}	404
	4	27	1.935	7.1×10^{-10}	3.7×10^{-10}	308
	5	44	1.06	3.7×10^{-11}	3.5×10^{-11}	343
	6	45	1.31	1.6×10^{-11}	1.2×10^{-11}	203
	7	42	0.94	6.5×10^{-11}	6.9×10^{-11}	384
5A-9A 650 yards from Zero	1	17	2.11	1.0×10^{-8}	4.8×10^{-9}	131
	2	37	1.59	6.5×10^{-11}	4.1×10^{-11}	138
	3	30	1.08	2.6×10^{-11}	2.4×10^{-11}	427
	4	43	1.13	2.8×10^{-9}	2.5×10^{-9}	25
	5	1	0.67	3.7×10^{-11}	5.5×10^{-11}	241
	6	5	0.94	4.1×10^{-11}	4.4×10^{-11}	222
	7	50	1.04	3.2×10^{-11}	3.1×10^{-11}	414
3A 9A 300 yards from Zero	1	21	1.33	6.2×10^{-8}	4.7×10^{-8}	93
	2	35	1.01	8.5×10^{-10}	8.4×10^{-10}	418
	3	23	1.27	5.3×10^{-10}	4.2×10^{-10}	374
	4	8	0.93	1.4×10^{-7}	1.5×10^{-7}	197
	5	36	0.84	4.5×10^{-9}	5.4×10^{-9}	121
	6	7	2.3	4.0×10^{-9}	1.7×10^{-9}	365
	7	24	1.03	6.3×10^{-10}	6.1×10^{-10}	449

* Tissue dried at 500° C and extracted with Alcohol (95%) on filter paper planchets.

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Department of the Army Pamphlet No. 8-11 on Page 33 gives the tolerance values for food and water contaminated with fission products. The table therefrom is reproduced below:

Time Water is to be consumed	Beta in Food and Water: Fission Products			
	Safe		Low Acceptable Risk	
	curies per cm ³		curies per cm ³	
10 days	3.5×10^{-9}		9×10^{-8}	
One month	1.1×10^{-9}		3×10^{-8}	

Comparison of these values with the curies per gram observed in the tissue blocks of the exposed meat shows that this meat could have been eaten with safety when recovered after washing and cutting away 1/2 inch of the outside surface.

The original data and calculations concerning this experiment are on file in the Radiation Branch, Weapons Effects Division, Hq., AFSWP, P. O. Box 2610, Washington, D. C.

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Effects of Radioactive Dust

Preliminary analysis of particles of dust in the cloud following "S" shot indicated that a large percentage of the active particles were of the size range for respiratory retention. This can possibly be explained by the fact that the earth in the test area is of similar particle size. The complete dust story will be available in the final report of Operation JANGLE.

Dogs and sheep exposed to this dust cloud did inhale and retain in their bodies radioactive material. (See Tab III-K)

It should be pointed out that a "well fitted" standard Army gas mask gives complete protection against this respiratory hazard. The commercial type dust respirator is markedly inferior to gas masks in the degree of protection afforded.

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EFFECTS ON ANIMALS

The following information was supplied by the Effects Test Group of Operation JANGLE:

In this test, a total of 46 animals (26 dogs and 20 ewes) were arranged in arcs 2500, 5000 and 8000 feet distant from ^{underground} ~~surface~~ zero. These arcs extended from 45° E of N line to about 40° W of N. Since the test with animals involved serial killings it is impossible to give a clear picture of the mortality which occurred. Furthermore, only nine sheep and nine dogs were recovered at H / 6 hours, while the remaining animals were recovered at H / 24 hours. Thus the animals suffered two different radiation exposures, the intensity of which may only roughly be estimated. The following table gives pertinent data:

Table 1 - Mortality and Total Dosage in Animals
Exposed During "U" Test at Surface Stations

Animal	Distance from Underground Zero (Feet)	Station Position	Day of Death	Dosage at Station in Roentgens	
				Polaroid Film Packet	N.B.S. Film Packet
Dog #3	2500	600' E of N	D / 4	> 400	2960
Dog #9	2500	1000' E of N	D / 4	- -	2525
Dog #31	2500	400' W of N	D / 4	> 400	1800
Pup* A	2500	400' W of N	D / 4	> 400	1800
Dog #2	5000	600' E of N	D / 8	> 400	- -
Dog #10	5000	600' W of N	D / 4	> 400	- -
Pup* B	5000	300' W of N	D / 8	> 400	- -
Dog #16	8000	1600' E of N	D / 8	> 400	- -
Pup* C	8000	800' E of N	D / 4	> 400	- -
Ewe #3	2500	600' E of N	D / 4	> 400	2425
Ewe #5	2500	200' E of N	D / 6	> 400	1800
Ewe #24	2500	600' W of N	D / 8	> 400	- -
Ewe #9	5000	300' E of N	D / 5	> 400	- -

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Ewe #8 5000 900' E of N D / 4 >400 19.3

* 7 to 9 week old pups were exposed during the test in order to study the effects of the exposure on juvenile dogs.

No fox hole animals have died of radiation effects to date (8 Dec. 1951). As in the "S" tests, the fox holes were placed at the 45° E of N line at 2500 and 5000 feet. Their total dosage was less than that received by surface-exposed animals, the highest being 234 r(Polaroid) and the least being 23 r (Polaroid).

No preliminary statement can be made respecting the partition of the total dosage between inhaled or ingested contamination and that due to residual (ground) contamination. It is clear, however, that nearly all tissues examined contain significant amounts of radioactive material.

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

MEMORANDUM

29 November 1951

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

<u>UNIT</u>	<u>HOME STATION</u>
Hq & Hq Btry III Corps Arty	Ft Lewis
231st Engr C Bn	Ft Lewis
359th Engr Util Det	Cp Cooke
3623d Ord Co (MM)	Cp Cooke
Det, Hq & Hq Co 303d Sig Svc Bn (1)	Cp Cooke
Det, Hq & Hq Co & Co "J", 314th Sig Svc Bn (-)	Cp Cooke
Co "C" 505th MP Bn	Cp Roberts
1 Plat 523d QM Sub Dep Co (-)	Utah Gen Depot
4th TC Trk Co	Cp Stoneman
2 Plat, 92d TC Car Co	Cp Roberts
806th APU	Ft Lewis
4 Sections, 562d Staging Area Co	Cp Stoneman
16 Food Service Personnel	Presidio of SF

BY COMMAND OF BRIGADIER GENERAL FITCH:

OFFICIAL:

HARRY P. STORKE
Colonel, Arty
Chief of Staff

JAMES J. CRAWLEY
Major, AGC
Adjutant

DISTRIBUTION:

CG Sixth Army	5
(Col. Fox, AG Misc)	3
Ea Staff Section	3
Ea Orgn Concerned	3
File	2

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SIXTH ARMY COMMANDER AND EXERCISE SUPERVISOR

Lieutenant General Joseph M. Swing

CAMP COMMANDER AND EXERCISE DIRECTOR

Brigadier General B. M. Fitch

CHIEF OF STAFF

Colonel Harry P. Storke

DEPUTY CAMP COMMANDER

Colonel Calvin A. L. Dickey

EXECUTIVE OFFICER

Lt. Col. Alfred B. Banks

STAFF

S-1 Major James J. Crawley

S-2 Major Joseph H. Wright

S-3 Major Glenn A. Smith

S-4 Lt. Col. Jerome W. Suhr

INSPECTOR GENERAL: Lt. Col. Lex M. Stout

SIGNAL OFFICER: Major Richard A. Wetzel

ORDNANCE OFFICER: Major D. E. Klinker

ENGINEER OFFICER: Lt. Col. Ira M. F. Gaulke

TRANSPORTATION OFFICER: Capt. Claude H. Currey

QUARTERMASTER: Major Joseph F. Hunt

STAFF JUDGE ADVOCATE: 1st. Lt. Ralph W. Johnson

AIR OFFICER: Capt. John A. Bollard

MEDICAL OFFICER: 1st. Lt. Phillip H. Henderson, Jr.

SPECIAL SERVICE OFFICER: Major George L. Crutcher

CHEMICAL OFFICER: Col. S. E. Whitesides, Jr.

PROVOST MARSHAL: Major Ernest J. Verba

POST EXCHANGE OFFICER: 1st. Lt. Arthur L. Sell

PUBLIC INFORMATION OFFICER: Capt. Thomas D. Boyd

VISITORS BUREAU: Capt. Peer A. Buck

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HEADQUARTERS
Camp Desert Rock, Las Vegas, Nevada

Observers' Instruction Schedule

27 November 1951

Date	Hour	Subject	Instructor	Place
Wednesday 26 Nov 51	0800-0810	Introductory Remarks	Gen Fitch	Theater Tent
	0810-0820	Security Orientation	Mr Leeson	Theater Tent
	0820-0830	Desert Rock and Test Objectives	Major Jessup	Theater Tent
	0830-1300	Frip to and inspection of Test Layout	Major Stefanowicz	Test Site
	1430-1520	Basic Weapons	Major Senior	Theater Tent
	1530-1650	Nuclear Physics	"	Theater Tent
Thursday 29 Nov 51	0851-1200	Visit to Test Site	Major Smith	Test Site
	1330-1420	Bomb Physics	Major Senior	Theater Tent
	1430-1520	Bomb Effects (Initial Nuclear Radiation) Thermal Radiation and Incendiary Effects)	Cmdr Pollock	Theater Tent
	1530-1620	Bomb Effects (Shock from Air, Underground and Underwater Burst)	"	Theater Tent
	0900-0950	Bomb Effects (Initial Nuclear Radiation, Thermal Effects & Incendiary Effects)	Cmdr Pollock	Theater Tent
Friday 30 Nov 51	1000-1145	Bomb Effects (Shock from Air, Underground & Underwater Bursts & Physical Damage)	Cmdr Pollock	Theater Tent
	1330-1630	Meeting of Seminar Groups for Discussion & Preparation of Reports	Group Leaders	Group Tents
	0800-1200	Visit to Test Site	Major Stefanowicz	Test Site
Saturday 1 Dec 51	1330-1430	Medical Aspects of Atomic Disaster	Lt Col McConnell	Theater Tent
	1430-1500	Effects at Hiroshima and Nagasaki	Brig Gen Sims	Theater Tent

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

27 November 1951

SUBJECT: Seminar

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TO: Observer Personnel, Operation Desert Rock III

1. It is desired that the maximum possible professional benefit be derived from your visit to Camp Desert Rock and to the Nevada Test Site.
2. Therefore, during the latter part of your stay at Camp Desert Rock, a seminar will be conducted, at which time your impressions concerning the Nevada atomic tests and your conclusions and recommendations resulting therefrom will be presented to the class. Tentatively, the seminar is scheduled for 4 December 51; this date may be changed, if necessary because of change in conditions involving Operation Desert Rock III which cannot now be foreseen.
3. You have been divided into discussion groups by branch of service. Prior to the seminar, each group will meet under the leadership of the indicated group leader, for discussion; for formulation of findings, recommendations, or ideas; and for preparation in writing of the group report. In addition, it is hoped that there will be discussions and formulation of ideas on atomic warfare during your free time. During the seminar, group leaders will be called upon to present their group reports. These reports need not be confined to majority opinions of the group; views and ideas of individuals are desired, as well.
4. Our reason for conducting this seminar is that many of you are connected with various schools throughout the Army and in that capacity have had experience with the tactical as well as the strategic doctrine of your various branches. Some of you are in positions where you can influence the formulation of atomic doctrine. Each of you will observe this test from a specific point of view, your own or that of your branch, and will have ideas along the lines in which you have been trained. It is desired to record and forward those ideas with any resultant recommendations to higher headquarters for their consideration and use.
5. In preparing your papers for the seminar, conclusions or recommendations as regards the following points are desired insofar as practicable.
 - a. From the point of view of your branch of service, what conclusions or recommendations may be drawn by the use of the atomic weapons in:
 - (1) Design of equipment
 - (2) Availability and use of specialized equipment in forward areas.
 - (3) Disposition, handling and transportation of equipment in forward areas.
 - (4) Specialized training to cope with enemy atomic attacks.

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SUBJECT: Seminar (Continued)

b. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

- (1) Disposition of troops in the attack.
- (2) Disposition of troops in the defense.
- (3) Disposition of troops in the rear area.
- (4) Availability and use of special, technical personnel or troops in forward areas.
- (5) Training and indoctrination of troops.

c. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I, II, and III, what is your estimate of the missions best suited to Department of the Army in future tests, with regard to both troop training and further experimentation of any military nature?

d. What general and specific policies and procedures should the Department of the Army adopt now in order to accomplish practically and expeditiously proper indoctrination and training of Army Troops with respect to atomic warfare?

FOR THE COMMANDING GENERAL:


JAMES J. CRAMLEY
Major AGC
Adjutant

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

3 December 1951

The Atomic Bomb -- As it effects the Combat Arms and Technical Services.

FOREWARD

A meeting of discussion groups as outlined in letter directive, Hq, Camp Desert Rock, dated, 27 Nov 51, subject: Seminar (Enclosure 1), was held at Camp Desert Rock, 30 November 1951. Lack of time precluded holding of the seminar. However, group reports were prepared and are presented herewith:

GROUP I. INFANTRY
COLONEL FREDERICK H. LOMMIS, Chairman

General: Group I, led by Colonel Frederick H. Lommis, consisting of Infantry officers, discussed the subjects outlined in the Seminar Directive and reached conclusions as outlined herein. These conclusions are based on the assumption that the enemy will use atomic weapons against us. The following points were considered:

1. From the point of view of the Infantry, what conclusions or recommendations may be drawn by the use of the atomic weapon in:

a. Design of equipment.

(1) No radical changes in design of Infantry equipment are indicated. Delicate equipment, such as instruments, will require protection from blast.

b. Availability and use of specialized equipment in forward areas.

(1) Military devices, such as Geiger counters, dosimeters, and film badges, for the detection and measurement of radioactivity, must be provided for front line troops.

(2) There is a need for additional entrenching equipment, both mechanical and manual, for speed in digging in.

c. Disposition, handling, and transportation of equipment in forward areas.

(1) No change.

d. Specialized training to cope with enemy atomic attacks.

(1) Specialized training of individuals should be conducted during regular training programs. Such training programs should include:

(a) Effects.

(b) Protective measures.

(2) A directive for such training is being prepared by OCAFF, including command training as well as individual training.

2. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

a. Disposition of troops in the attack.

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(1) Present attack formations are sound. Troops concentrating for attack are dispersed.

(a) 35 square miles for Infantry and Armored Divisions.

(b) 40 square miles for Corps Headquarters and troops.

b. Disposition of troops in the defense.

(1) Care must be exercised in all defensive situations to insure that reserve and artillery concentrations do not exceed battalion size.

(a) In the linear defense, mobile defense, and delaying action, dispersion is adequate.

(b) The protection afforded by fortifications and the normal dispersion of units in the position defense give adequate protection against atomic attack.

c. Disposition of troops in the rear area.

(1) In rear areas, emphasis must be placed on dispersion and overhead cover.

d. Availability and use of special technical personnel or troops in forward areas.

(1) Infantry units should train its own personnel.

e. Training and indoctrination of troops.

(1) Same as 2 d (1), above.

3. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I, II, and III, what is your estimate of the missions best suited to Department of the Army in future tests, with regards to both troops training and future experimentation of any military nature?

a. There is a need of practical exercises to test present policies and doctrine.

4. What general and specific policies and procedures should the Department of the Army adopt now in order to accomplish practically and expeditiously proper indoctrination and training of Army Troops with respect to atomic warfare?

(1) See 3 (a) above. Department of the Army should continue requesting release by AEC of atomic weapons so that practical tests may be conducted.

GROUP II, ARTILLERY

COLONEL THOMAS G. KEITHLY, Chairman

General: In compliance with letter, Hq, Camp Desert Rock, 27 Nov 1951, subject: "Seminar", the following report is submitted. The conclusions and recommendations presented herein represent the unanimous opinion of the officers of the Artillery group. They are presented only from the point of view of the Artillery, and do not necessarily apply to the other branches of the service.

1. From the point of view of your branch of service, what conclusions or recommendations may be drawn by the use of the atomic weapons in:

a. Design of equipment.

(1) Recommend the development and standardization of the 280 mm gun and contingent equipment and the activation of 280 mm gun battalions expedited.

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(2) Recommend the development of rockets with acceptable degree of accuracy be expedited.

(3) Recommend studies be made of means of locating targets at long ranges.

(4) No change is indicated in equipment presently used by the artillery,

b. Availability and use of specialized equipment in forward areas.

(1) Development and issue of radinc equipment.

c. Disposition, handling, and transportation of equipment in forward areas.

(1) No change in present doctrine and practices is indicated, except that greater emphasis should be placed on dispersion of artillery battalions and better digging-in of equipment and personnel.

d. Specialized training to cope with atomic attacks.

(1) Not commented upon.

2. Conclusions and recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch.

a. Disposition of troops in the attack.

(1) No change from present doctrine is indicated, except for greater dispersion between artillery battalions and adjacent troops. Division, Corps, and other headquarters must coordinate, to some extent, the location of units, to avoid concentrations of such size as to present remunerative target for atomic weapons. This responsibility of such headquarters should be clearly stated in appropriate field manuals.

b. Disposition of troops in the defense.

(1) See 2 a (1).

c. Disposition of troops in rear area.

(1) See 2 a (1).

d. Availability and use of special technical personnel or troops in forward areas.

(1) No specialists, as such, are required in the Artillery. A portion of the present organic personnel of all units should be trained in radiation detection and decontamination. A few men in the 280 mm gun battalions must be trained in the handling and assembly of the atomic shell.

e. Training and indoctrination of troops.

(1) All enlisted men, in their basic training and periodically thereafter, should be taught the capabilities, limitations, and effects of, and the means of protecting themselves from, atomic weapons.

(2) A course similar to the present Staff Officers Orientation Course now conducted at Santa Base should be incorporated in the regular Artillery Officers Basic and Advance Courses, OCS Courses, and the C & GSC and Army War College Courses. It is believed all officers should attend. Repetition in the higher course is justified as "refresher" for all officers abreast of the latest developments and changes.

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(3) The play of atomic weapons, both offensively and defensively, and as realistically as possible, through all echelons, should be incorporated in all maneuvers and large field exercises.

3. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I, II, and III, what is your estimate of the missions best suited to Department of the Army in future test, with regard to both troop training and further experimentation of any military nature?

a. It is recommended that future tests of atomic weapons include the following:

(1) Animals be used to obtain more data on atomic effects on living organisms. Animals should be placed inside of tanks, vehicles, and structures, where personnel will probably be located.

(2) Effects on radar equipment.

(3) Combining a test with a ROT problem and later with division maneuvers.

(4) As many officers and men as possible should observe tests.

4. What general and specific policies and procedures should the DA adopt now in order to accomplish practically and expeditiously proper indoctrination and training of Army troops with respect to atomic warfare.

a. It is recommended that the Department of the Army be given control of atomic weapons tests of a tactical and training nature.

b. It is recommended that the above recommendations pertaining to the training and indoctrination of troops be implemented as soon as practicable.

c. This group does not believe that atomic weapons will materially change the doctrine, tactics, or technique of Artillery.

GROUP III. ORDNANCE AND ARMOR
LT COLONEL ROY C. BREWER, Chairman

General: The following report is submitted following the discussion meeting of Ordnance and Armor officers, (Group III), who were among the observers at Operation Desert Rock III. The report represents the personal opinions of the officers concerned, and in no way necessarily represents the opinions of the Ordnance and Armor branches of the Army.

1. From the point of view of your branch of service, what conclusions or recommendations may be drawn by use of the atomic weapon in:

a. Design of equipment.

(1) It is felt that no basic changes in equipment are necessary as result of the possible tactical use of the atomic bomb, nor will any specialized equipment be required in combat areas. However, it is believed that fragile spare parts, such as sighting equipment, radio tubes, radio antennae, etc, should be stored in safe positions and be readily available to use as replacements.

b. Availability and use of specialized equipment in forward areas.

(1) There probably will be a need for soldiers in forward areas to have dust respirators. Since a gas tank drain plug on one vehicle near a recent atomic bomb blast was blown out or sucked out of the tank, the subject of gas tanks should be looked into thoroughly and plans made to strengthen these tanks, not only at the drain plug but also at the seams and other fittings.

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(2) For first echelon decontamination, each vehicle should be equipped with at least one whisk broom.

(3) There appears to be an outstanding need for a method of surely and quickly retrieving knocked out vehicles.

(4) Because of dust arising from the area of an atomic blast, it is suggested that exposed, lubricated surfaces, should be dry treated and that oil or grease not be used.

c. Disposition, handling, and transportation of equipment in forward areas.

(1) Normal dispersion should be adequate protection for an armored division. Because of the intense heat emanating from the center of an atomic explosion, it is felt that the exteriors of vehicles should be kept free of inflammable items such as ration cartons, barracks bags, etc. This is especially true of tanks, as such small items ablaze can easily set a tank on fire.

d. Specialized training to cope with enemy atomic attacks.

(1) Specialized training certainly is necessary for all soldiers who may have to cope with enemy atomic attacks. Every soldier should be familiarized with the effects of atomic weapons. He should be taught methods of protection, and he should learn how to decontaminate himself and his equipment. This should be treated as a basic military subject.

2. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

a. Disposition of troops in the attack.

(1) No change is recommended in the tactical disposition of soldiers or vehicles in the attack. An armored division in the attack covers such too large an area to be a profitable A-bomb target.

b. Disposition of troops in the defense.

(1) Defensive dispositions should remain much the same, the only exception being that the reserve force should be kept about three miles from the main line of resistance, but only when terrain and other conditions permit.

c. Disposition of troops in rear area.

(1) In the rear areas, dispersal is mandatory.

d. Availability and use of special, technical personnel or troops in forward areas.

(1) There should be adequate trained personnel with instruments with each platoon, to record radiological data. This personnel should be the trained instructors for their units.

e. Training and indoctrination of troops.

(1) In future nuclear experiments, more consideration should be given to the role the military may play in atomic operations. There should be as much troop participation as possible in future explosions in order that unjustified fear among the soldiers as regards the A-bomb, will be dispelled. Second, it has been demonstrated that the troops who will fight over certainly should be given an opportunity to judge it in its proper perspective.

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GROUP IV, ENGINEERS, TRANSPORTATION, AND MILITARY POLICE.
COLONEL ROYD W. BARTLETT, Chairman

General: The nature of the problems presented to these services are such that many of the items of the suggested agenda are not particularly applicable. Accordingly, this group has organized its report under two main headings (1), equipment and (2), training and indoctrination of personnel. Discussion under each head follows:

1. Equipment:

a. In order to minimize the effect of atomic weapons, the following conclusions and recommendations pertaining to Engineer and Transportation equipment are submitted:

(1) The threat of atomic warfare will necessitate the establishment of flexibility in the means and methods for the landing and inland movement of personnel and cargo. Ports are likely to be prime targets for atomic weapons. It is therefore necessary that the proper equipment and troop units be available to provide for the landing of large quantities of cargo and personnel through shallow draft ports, over beaches, and over even coast line where beaches are not available. The articles of equipment, some of which are under development, which should be available to accomplish the landings under conditions discussed above are:

(a) Large amphibious vehicles which will handle the heaviest items found in an armored division (approximately 50 short tons).

(b) Transportation aerial tramways to permit discharge of vessels off shore over rough coast lines.

(c) Floating pods which may be launched from ships off shore and snaked into the large amphibious vehicles and taken ashore (approximately 5 short ton capacity).

(d) A portable pier, suitable for rapid installation, which will afford protection against tidal and weather conditions (the De Long pier is an example of this item).

(e) A roll-on, roll-off ship which can be loaded with prestowed trailers or containers in the ZI and discharged in shallow draft ports overseas (20 feet of water) by rolling the load off rapidly. The trailers and/or containers could then be moved inland rapidly. The ship could be turned around in a minimum of time, thereby reducing its vulnerability and permitting more ship turn-around out of each vessel.

2. Training and Indoctrination of Personnel:

a. Training of military personnel and individuals.

(1) Until recently the basic indoctrination and training of all military personnel on an individual basis has been largely done with elemental and unclassified information. This has been necessitated perhaps by an overriding need for security during the development phase of these new weapons. Another factor has been the incomplete nature of the test data resulting from a very small number of nuclear explosions. The time is rapidly approaching, if indeed it is not already here, when a gradual lowering of security classification and a more firm accumulation of evaluated data will enable us to tell the "consumer" (American soldier) more and more of factual information and less of speculation. Nuclear indoctrination and training of Engineers, Transportation Corps, and Military Police personnel must begin at this time. They are indoctrinated and trained in conventional weapons, and are not indoctrinated in nuclear warfare. This means that they must be provided with authentic and accurate information on nuclear warfare during their first exposure to military service, whether

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it be in recruit basic training, ROTC, Guard and Reserve training or UMT. This initial training must scrupulously avoid "scare" information and stress nuclear weapons solely as new and very powerful means of fighting battles. New entrants into military service must have de-emphasized immediately their previous concepts of atomic warfare involving strategic bombings of cities, factories, and other quasi-civilian targets. As military men they must then be re-indoctrinated in, (a) what our own existing nuclear weapons can and cannot do in military situations, (b) what we can expect from an enemy of such weapons against our own military formation and targets: (c) how their weapons, vehicles, and other equipment will function or not function after various types of probable nuclear attacks. And last, but not least, a concept that a nuclear blast will not kill them and deadlier than a direct hit or near miss by conventional explosives.

(2) Each basic training cadre must contain a few officers, NCO's, and PM who have actually witnessed nuclear explosions. These cadre personnel must not be unduly prohibited from freely discussing their individual experiences in viewing the effects of nuclear tests. Detailed scientific facts need not be given out or discussed, but a healthy amount of informed group discussion of observed practical effects must be permitted.

(3) This initial basic nuclear indoctrination must be followed up at least yearly at a more advanced level of information during unit training.

b. Training of individuals in units:

(1) All these services will have units in areas which may be targets for an atomic attack. Units of all these services also operate in small groups or as individuals. They must therefore be taught how to protect themselves first and then taught what to do until instructions can be disseminated from higher headquarters. Some of the subjects which should be taught follow:

(a) Monitoring: Each unit likely to be in a target area should have monitoring crews and all individuals in the unit should be given sufficient training in the use of detection devices to allow them to use the devices in an emergency.

(b) Protection of equipment and supplies: Individuals and small groups must be taught the necessity for protecting valuable supplies which may not be permanently damaged.

(c) Evacuation of populations and/or troops to alternate areas: Military police must be trained in control of civilian population, to include supervision of panic, rioting, and pilfering. They must control movements of populations and know locations of all important installations in order to give intelligent directions.

(d) This committee is of the opinion that it would be a desirable goal if at least one member of each unit of company size could have witnessed an atomic test, in order to bring home to him the fact that reasonable protection is possible if each individual utilizes the means available to him to eliminate excessive fear by disseminating results of the test to members of his unit upon his return. We believe that the cost of transporting these individuals to and from the test site is not excessive when compared to the overall cost of the test shot.

GROUP 1 UNCLASSIFIED DATA AGC
MAJOR BRAN COHEN
Atomic Energy Administration

General: In accordance with letter, Headquarters, Camp Desert Rock, dated 27 Nov 1951, subject: "Seminar", the report contained herein is submitted from the Signal Corps observers at Desert Rock III. The following recommen-

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ations are offered, per paragraph 5, reference letter.

1. From the point of view of your branch of service, what conclusions or recommendations may be drawn by the use of the atomic weapons in:

a. Design of equipment.

(1) Continue present miniturization trends.

b. Availability and use of specialized equipment in forward areas.

(1) Bury field wire 6-8 inches.

(2) Provide additional shielding at splices to insure uniform resistance to thermal radiation.

(3) Develop a portable hand-plow for burying wire.

c. Disposition, handling, and transportation of equipment in forward areas.

(1) Bury operating reserves and equipment.

d. Specialized training to cope with enemy atomic attacks.

(1) Give all troops concerned training similar to old gas drill.

2. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

a. Disposition of troops in attack, defense, and rear areas.

(1) Maximum dispersion of troops and equipment consistent with tactical and service requirements.

b. Availability and use of special, technical personnel or troops in forward areas.

(1) Designation and specialist training of personnel in the use and repair of monitoring equipment.

c. Training and indoctrination of troops.

(1) Remove mystery by emphasis on effects of nuclear explosions.

(2) Downgrading information so that it may be presented to the troops by omission of technical characteristics (presented in lay terms).

3. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I, II, and III, what is your estimate of the missions best suited to Department of the Army in future tests, with regard to both troop training and further experimentation of any military nature?

a. As a result of knowledge gained, it is our opinion that the following be done.

(1) Show to all troops, both active and reserve, motion pictures of nuclear explosions, with classification no higher than RESTRICTED. This film should include the effects and protective measures.

(2) Accompany films with indoctrination teams, with allied equipment.

(3) Presentation to be given in accordance with Atomic Energy Act 1946 and Department of Defense Safeguards. Do not use Military Classification Safeguards.

(4) Subsequent observers be given maximum amount of instruc-

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tion (on location) prior to the detonation, followed by analysis of effects, viewing of the test site, then seminar.

(5) Distribute a uniform course of instruction to be included in unit training programs (not part of "I&E").

Major Paul Britt, AGC and Captain Reynold Bennett, JAGC, due to the nature of their assignments were asked to prepare separate reports. Their reports are as follows:

MAJOR PAUL BRITT, AGC

1. The lectures and discussions have been most enlightening in bringing me up-to-date in the potentialities of the atomic weapon, its effects, and possible suitable means of eliminating or reducing the harmful effects.

2. Conclusions:

Ref para 5, letter subject: Seminar, 27 Nov 51
a 1, 2, and 3. No special comment.

5. a (4) As a former school man I'm firmly convinced that a number of training films showing effects of atomic explosion, methods of decontamination, and procedures for protecting oneself and equipment from atomic explosion, repeated when necessary, would so familiarized personnel with atomic explosion that they would lose their abject fear of atomic reaction and would voluntarily and with enthusiasm be prepared to take appropriate action in the event of atomic attack. These films could be followed by discussions, and perhaps some radioactive material (relatively mild) could be made available along with instruments (Geiger counters) to identify the material. This training need include little of the scientific aspects of the action occurring, but could include practical indoctrination in detection of radioactivity and protection from all effects of atomic explosion.

5. b (5) I believe it would be highly desirable to take a picture of a group such as ours, showing the precautions taken, decontamination procedures and effects, leaving out such details as would be higher than restricted or confidential at most, making it possible for complete discussion by and presentation to troops. Knowledge that effective measures are available for protection under many conditions should be made known to all troops. Certainly, potential enemies of the United States are now familiar with all such measures that would need to be passed on to military and civilian personnel.

5. c After troops have been oriented and indoctrinated, as outlined very briefly in comments above, a few hours of practical application under field conditions should be conducted under a simulated atomic attack. Note: Specific provision for entering on records exposure to atomic radiation should be made.

CAPTAIN REYNOLD BENNETT, JAGC

Congress must be impressed by:

a. The limitations of the A-bomb - i.e.; physical destructive power and tactical adaptability in the field as well monetary limits - show that manpower is still of prime consideration in carrying out tactical warfare.

(1) The A-bomb has a certain destructive range of effectiveness whether pressure, thermal, or radiation limitations are considered.

(2) In deployed operations, whether of troops or supplies, the advisability of extended stay is a ~~question~~ ^{problem}. "Why kill a fly with a club"? In ~~other words~~ ^{specific restricted data} the ~~present~~ ^{present} ~~limitations~~ ^{limitations} ~~of the A-bomb~~ ^{of the A-bomb} ~~is limited~~ ^{is limited}. ~~Use military and civilian safeguards.~~

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b. The usage of the A-bomb is largely strategic, i.e., primarily limited to the destruction of large concentrated targets, e.g., industrial centers, submarine pens, seats of Government, etc. The individual soldier with high morale, good individual equipment and imbued with a firm belief in American and democratic principles, is of prime importance and complementary to atomic firepower.

GROUP VI. QUARTERMASTER
COLONEL JOSEPH E. JAMES, Chairman

1. From the point of view of your branch of service, what conclusions or recommendations may be drawn by the use of the atomic weapons in:

a. Design of equipment.

(1) Equipment will be effected by amount of blast and heat to which it is subjected. This is a variable and is dependent upon proximity to the explosion. Effect of radiation is not permanent, as items can be decontaminated by time or mechanical cleaning. Redesign is not indicated.

b. Availability and use of specialized equipment in forward areas.

(1) Geiger counters and protective clothing, such as gloves, boots, dust respirators, especially for such units as GRS and Quartermaster salvage, as needed to accomplish their missions.

c. Disposition, handling, and transportation of equipment in forward areas.

(1) No change.

d. Specialized training to cope with enemy atomic attacks.

(1) In addition to training common to all branches, specialized training should be given to Quartermaster personnel insuring that:

(a) All items stored in dumps should be in containers or covered to preclude any contamination.

(b) Methods of testing, recovery, and decontamination of supplies will include:

(1) Perishable and non-perishable supplies.

(2) Clothing and equipment.

(3) POL

(4) Deceased personnel and miscellaneous supplies.

(2) Specialized training in methods and procedures for the recovery of materials classified as salvage, in coordination with other interested agencies.

(3) Specialized training in methods and procedures for recovery of remains, decontamination of bodies, mass burials, based on casualties which could reach to proportions of Hiroshima. In all probability, troops other than QM GRS will be required to carry out GRS functions. Basic procedures, therefore, should be included in other arms and services training.

2. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular interest to your branch. Consider:

a. Disposition of troops in the event of an atomic attack.

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(1) So far as disposition of QM troops is concerned, in either attack or defense, locations will conform to the disposition of elements being supported.

b. Disposition of troops in the defense:

(1) Same as 2. a. (1) above.

c. Disposition of troops in the rear area:

(1) The present organization of QM supply and service units in rear areas has been proved sound and allows for adequate dispersal. Use of General Depot Organization type units will only complicate command structures. The guide in establishing supply points in services should be based on the principle that one can function as an alternate for another. In other words, "do not put all your eggs in one basket". These alternate dumps should be held to a minimum to reduce the problem of communications, command structure, and protection. Disposition cannot be so dissipated that efficiency of operations is lost, or else adjacent units cannot furnish mutual protection against ground or guerrilla operations.

d. Availability and use of special, technical personnel or troops in forward areas.

(1) It is not visualized that additional specialized or technical personnel will be required. Some consideration, however, should be given to making personnel available to affected areas when required.

e. Training and indoctrination of troops.

(1) Training and indoctrination of troops - see above.

3. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I, II, and III, what is your estimate of the missions best suited to Department of the Army in future tests, with regard to both troop training and further experimentation of any military nature?

a. To properly disseminate information, troops should participate as observers of each demonstration. Troops should be from all types of Army units, to include CBR personnel. It is believed that experimentation might be of benefit to determine effect and extent of recovery which can be effected on bread, fresh fruits and vegetables, meats, etc.

4. What general and specific policies and procedures should the Department of the Army adopt now in order to accomplish practically and expeditiously, proper indoctrination and training of Army Troops with respect to atomic warfare?

a. Policies and procedures to accomplish the expeditions indoctrination and training of troops should be general in nature and specifically pointing out the effects of the bomb, methods and protection against heat and blast, and radiation contamination, and the simplicity of counter-acting the results of radiation.

GROUP VII. CHEMICAL CORPS
LT COLONEL KENNETH S WHITE, Chairman

General: From the point of view of the Chemical Corps, the following conclusions and recommendations of the Chemical Group, Desert Rock III, in regards to the use of atomic weapons were submitted.

1. From the point of view of Army service, what conclusions or recommendations may be drawn by the Department of the Army regarding the use of atomic weapons in the future?

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a. Design of equipment:

(1) In general, Chemical Corps equipment is adequate for use in atomic warfare. The mask, protective, field, provides protection against ingestion and inhalation of radioactive particles. However, certain equipment may be modified to reduce the amount of contaminating material that can settle on the surfaces. To this end, all surfaces should be smooth, sharp angles eliminated, and exposed appurtenances enclosed in housings. Power-driven decontaminating apparatus should be modified to include a vacuum cleaner for drawing radioactive particles from equipment which cannot be cleaned easily by brushes or by washing.

b. Availability and use of specialized equipment in forward areas.

(1) The number of power-driven decontaminating apparatus allotted to the field army should be increased.

c. Disposition, handling, and transportation of equipment in forward areas.

(1) The principle of dispersion should be followed in forward areas until equipment has to be employed.

d. Specialized training to cope with enemy atomic attacks.

(1) Greater emphasis should be placed on CBR Unit Defense Personnel training. The course of instruction can be made more practical and profitable by:

(a) Reducing time spent on teaching physics and theory.

(b) Devoting more time to training in the use of monitoring equipment, and practical exercises.

(c) Troops should be taught what constitutes profitable tactical targets for atomic attack.

(d) More training should be done with the mask, including concurrent training, and instilling in troops confidence in the mask.

(e) Play of atomic weapons should be included in all maneuvers.

2. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

a. Disposition of troops in the attack.

(1) Combat troops of the Chemical Corps are the 4.2 inch mortar units and smoke generator units. The mortars are normally disposed in defilade: the smoke generator units must be placed according to their mission. No special disposition because of a probable attack can be considered if these troops are actually engaged in a mission.

b. Disposition of troops in the defense.

(1) The same principle as in sub-paragraph 2a must be observed in defensive situations.

c. Disposition of troops in the rear area.

(1) Troops in rear areas should be dispersed as much as the situation will allow. The principle of dispersion should be used as much as possible. ~~Specific Restricted Data Clearance~~ ~~Not~~ ~~Referred~~. Use Military Classification Safeguards.

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c. Disposition, handling, and transportation of equipment in forward areas.

(1) It is recommended that, in considerations of the above, the following principles be followed:

(a) Maximum practicable dispersion of medical supplies consistent with other considerations such as handling and safeguarding.

(b) Adequate advance planning to assure proper distribution of essential medical supplies at the right time and place. Maximum use of air transportability should receive primary consideration.

d. Specilized training to come with enemy atomic attacks.

(1) The training objective should be to dispel the mystery and dissolve the soldier's fear of the unknown as it pertains to the atomic weapon. It is felt that proper indoctrination to the company level may be accomplished by special training of all officers and key non-commissioned officers, to include platoon sergeants, who in turn will indoctrinate their own platoons. Training must be repeated, continuous, realistic and conducted by all possible training media.

(a) Added emphasis on the first aid care and handling of burn casualties by the individual soldier.

(b) Additional training of professional medical service personnel in a standardized method of treatment and care of burn and radiation casualties.

(c) More technical training of all medical service personnel to aid professional personnel in the treatment and care of burn and radiation casualties.

2. Conclusions or recommendations as regards the tactical aspects of the atomic weapon which are of particular moment to your branch. Consider:

a. Disposition of troops in the attack.

(1) It is believed that if the well established principles of dispersion, cover, and concealment are properly emphasized and practical, that atomic weapons, at least in their present form, will not constitute a problem that differs greatly from any other type of explosive agent. In regard to the disposition of medical components, again the present procedures should be adequate. It is believed that the casualties from an air burst atomic bomb can be provided adequate medical service by the medical strength normally available in the field army. Additional bombs would cause proportionately more difficulty in handling casualties if we are to provide the same standard of medical service.

b. Disposition of troops in the defense.

(1) No comment.

c. Disposition of troops in the rear area.

(1) Hospital, as well as all medical installations should be dispersed to the maximum degree consistent with other considerations such as ground defense, handling of patients, supplies, etc.

d. Availability and use of special technical personnel or troops in forward areas.

(1) No comment.

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e. Training and indoctrination of troops.

(1) No comment

3. As a result of knowledge gained or of reports you have heard about Operations Desert Rock I, II, and III, what is your estimate of the missions best suited to Department of the Army in future tests, with regard to both troops training and further experimentation of any military nature?

a. It is recommended that maximum military participation be continued at all atomic tests. Emphasis should be continued, as in Desert Rock I, on the indoctrination of enlisted men by observation of actual nuclear explosions and participation in exercises designed to familiarize them with the effects.

b. Theoretical war of atomic weapons in maneuvers should be continued and simulated as closely as possible to the actual situation. The play should be expanded to include medical as well as other considerations, and casualties should be assessed and evacuated.

4. Omitted by this group.

FITCH
Brig Gen

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Result: 

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~~SECRET~~

Camp Desert Rock, Las Vegas, Nevada

ANNEX 7 to Emplacement and
Equipment Test Plan for Exercise
Desert Rock III

2618000 Nov 1951

RADIOLOGICAL SAFETY PLAN

1. The following is Rad-Safe plan for military participation in Exercise Desert Rock III.
2. Activities prior to U-Day:
 - a. Indoctrination of all observer military personnel in the characteristics of nuclear explosions and the general effects of the atomic weapons. (MPSM)
 - b. Issue of film badge to each observer. (31g O)
 - c. Calibration-check of all radiac instruments to be used in the exercise. (Cml O).
 - d. Instruction of all monitoring personnel in their specific assignments and duties. (Cml O)
 - e. Procurement of additional clothing and boots, to be issued in the event of contamination of personal clothing. (CM)
 - f. Preparation of Personnel & Vehicle Decontamination Station to be located at Tucca Pass.
3. Activities on and after U-Day:
 - a. Physical check on all observers, as they entruck, to insure that they are equipped with film badges and gas mask. (This duty will be performed by the MP assigned to the observer vehicle.) 
 - b. Vehicles dispatched from Desert Rock will not be permitted to pass beyond a limiting point to be (designated) by the Rad-Safe Officer.
 - c. A radiological survey will be made by the Rad-Safe Officer (Major Servis, Cml Corps), who will report to the staff Cml Officer, Camp Desert Rock (Colonel Whitesides) on limits of advance into the contaminated area.
 - d. Upon exit of the observers from the forward area (on Observation Day), they will be monitored. An MP read-block will be established for control purposes. Tolerance for this operation will be an intensity reading of 20 MPH, with the beta shield open and held six inches from the body. Personnel whose body or clothing give a reading in excess of this tolerance will be decontaminated.
 - e. Decontamination of Test Equipment will be covered in separate instructions to the Effects Evaluation Teams.
 - f. Rad-Safe Officer will establish his headquarters at the Desert Rock Observation Point.

4. Radiation Tolerance Limit ✓

- a. Total: Three (3) roentgens DATA

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Brigade

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

ANNEX 10

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26 November 1951

DECONTAMINATION PLAN

1. Decontamination of the test equipment will be carried out according to the following plan:

a. The purpose of this decontamination is to remove radioactive contamination utilizing only TO & E equipment that is found in a battalion or smaller unit.

b. Three types of decontamination methods are to be used in this test. These methods are to be dry decontamination (brushed), semi-wet decontamination (damp rags) and wet decontamination (washing).

2. Sites for these stations will be selected by the chemical Officer.

3. Drivers of all test vehicles and decontamination representatives of the technical services will be reported to the Chemical Section. A 2-hour course in decontamination will be given on Tuesday 27 November 1951 at 1400 hours for the above mentioned people.

4. When the equipment is released from the test areas by the OIC, the personnel mentioned in paragraph 3 will proceed with their equipment to the designated decontamination areas.

5. Engineers will provide two trucks with 3000 gallon water tanks, pumps, and hoses at position to be designated by the Chemical Officer.

6. Evaluation, decontamination, radiological safety personnel and drivers of the test vehicles will draw film badges from Signal Corps as required prior to entry into test area after shot.

7. Engineers will set up showers for personnel at Yucca Pass on day observers enter area and maintain until evaluators have completed mission.

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HEADQUARTERS
Camp Desert Rock
Las Vegas, Nevada

Report on Radiological Safety and Decontamination Operations, Exercise Desert Rock II and III

1. The following operations were conducted by the Chemical Section before, during and after Shot-Days for Exercise Desert Rock II and III.

2. The Staff Chemical Officer was responsible for all Rad-Defense matters pertaining to the operations.

3. Activities prior to Shot-Day:

(a) Indoctrinated all participating military personnel in the characteristics of nuclear explosions and the general effects of atomic weapons.

(b) Conducted a calibration check of all radiac instruments used during the exercise.

(c) Instructed all monitoring personnel as to their specific assignments and duties.

(d) Prepared plans for the installation of Personnel and Vehicle Decontamination Stations to be set up at AEC Camp No 1, 4 miles South of "S" Shot Ground Zero.

(e) Installed high intensity film badges in revetted and unrevetted foxholes, emplacements, and on equipment as directed in Film Badge Layout Plan.

(f) Installed chemical items of equipment for test.

4. Activities on Shot-Day:

(a) Chemical monitors conducted a physical check on all observers as they boarded buses for the Observation Point, to insure that they were equipped with film badges.

(b) Assigned one Chemical Officer as a monitor to the VIP's.

5. Activities after Shot-Day:

(a) Following notification by the AEC of clearance into the test area an initial radiological survey was made by the Rad-Defense Officer who reported to the Staff Chemical Official, Camp Desert Rock, on the limits of advance into the Contaminated area.

(b) The Staff Chemical Officer reported to the Commanding General the limits of intensities in the area.

(c) On the day the observers entered the area, Chemical Corps monitors under the supervision of the Staff Chemical Officer and Rad-Defense Officer were assigned to each observer-Bus for Rad-Defense measures. The monitors performed their assigned duties while in area and collected all film badges after clearance from the area. Due to the fact personnel did not debark from the buses while in the shot area personnel monitoring was not performed.

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(d) Provided monitors for each evaluation team that went into the forward area.

(e) Set up equipment and personnel decontamination stations at Camp No 1.

(f) Collected all evaluation personnel film badges and turned the badges into the film badge laboratory located at the AEC Control Point,

(g) Obtained the film badge report from the laboratory and maintained an operational chart on total dosage received by each member of the evaluation team.

(h) Chemical personnel recovered the high intensity film badges and evaluated the damage to Cml Equipment.

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HEADQUARTERS

Camp Desert Rock, Las Vegas, Nevada

MEMORANDUM NUMBER 10

1 December 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 S-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 Signal Officer.

(3) Violations will be reported through Signal channels to the S-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 DR badges (see par 4c) or bearing other media of authorization.

f. Access to Campsite. Access to 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.

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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, S-2 Section, this headquarters.

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

(2) All personally owned photographic equipment and supplies will be turned over to the Provost Marshal, for safekeeping and will be returned to the owner upon departure of the unit.

(3) Unit commanders will make periodic inspections at frequent but irregular intervals to discover cameras and film not already impounded. When such equipment and supplies are discovered, the name, grade, serial number and unit of the owner will be reported at once to the S-2, this headquarters, and the photographic equipment and supplies turned over to the Provost Marshal.

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 S-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 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 S-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 at this headquarters.

4. Miscellaneous Atomic Energy Act 1946

Specific

a. Unusual Absences. The name, grade, serial number, unit and official duty assignment of all military and civilian Department of

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Defense personnel found to be absent without authority will be reported at once to the S-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 S-2, this headquarters.

c. Security Passes and Permits. (1) DR badges will be issued by the AWC 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 DR badge.

(3) DR badges will be turned in upon notification by S-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 S-2, this headquarters.

BY COMMAND OF BRIGADIER GENERAL FITCH:

H. B. STORKE
COLONEL ARMY
Chief of Staff

OFFICIAL:

James J. Crowley
JAMES J. CROWLEY

MAJOR

Adjutant

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HEAD UNIT IS
Camp Desert Rock, Las Vegas, Nevada

Administrative Study of the Terrain
In the "Desert Rock" Area

1. The Area:

a. The area studied is located 56 miles northwest of Las Vegas, Nevada, on US 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) US Department of Interior Geological Survey
Nevada-California
Las Vegas,
N 3600 - W 11500/40 1908

2. Purpose: The purpose of the study is:

a. To familiarize test personnel with terrain feature and climatological conditions in test area.

3. General Description of the Area:

a. Climatic. Existing climate is dry, hot. Wind of approximately 15 MPH from the south to the north from late morning until sunset. Possibility of flash thunderstorms with a 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 airfields. 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 sage 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 has been constructed at Yucca Flat.

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(4) Cultural Features. The dominant feature of the area is the two lane, high speed road recently built through the area from US Highway 95 north to Yucca Pass. 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: passes to south; main valley and road to the south.

(2) Hill 58.40 - 412.25 Altitude 7135. Observes: passes toward south; entire northern valley.

(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.

(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.

(6) Yucca Pass 58.50 - 408.80. High ground here on either side of main N - S road. Ridge on eastern side of road commands Yucca Flat, airstrip and observes entire northern valley to the north.

(7) Hill 59.50 - 498.00 Altitude 5270. Observes: Yucca Flat, airstrip, main road south from Yucca Pass.

(8) Skull Mountain 57.30 - 407.00 Altitude 5950. Observes: Flat ground north.

(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.

(10) Hill 57.60 - 405.40 Altitude 5000. Observes: Pass to west around Specter 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.

(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.

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

c. Obstacles. The only natural obstacles to test 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.

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 the ground troops, but such concealment is sparse and easily penetrable. The only concealment is provided by high ground.

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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.

(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).

(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.

(3) Access to the area from the northwest is nonexistent because of rugged mountains and no road or rail net.

(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 air strip at Yucca Flat, a dirt road from the southeast across Frenchman 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 enable 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 Timphute Range at the north end of Emigrant Valley. Smooth Top Mountain, 9340 ft., also guard the northeastern approach to the area.

Joseph A. Wright
JOSEPH A. WRIGHT
Major, Artillery
S-2

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COMPARISON of RESULTS
Exercises Desert Rock II and III
Conclusions — Recommendations



Part IV

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PART IV

Comparison of Results of Exercises Desert Rock II and III
Conclusions and Recommendations

Index

1. General Pages 249
2. Comparison of Results Pages 249-252
3. Limitations of the Tests Pages 252
4. Conclusions Pages 252-253
5. Recommendations Pages 254-256

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Part IV

Comparison of Results of Exercises Desert Rock II and III Conclusions and Recommendations

1. General.

a. In evaluating the results of the comparison made later in this part of the report, the reader should recall that the results shown here are for 1 KT weapons. Therefore, the areas of damage and lethal effects are necessarily small by comparison with the expected areas of damage from the operational weapons.

b. The yields of the operational penetrating weapon and surface burst weapons will be re- spectively. It should be recalled, also, that surface burst weapons can be produced for the same amount of fissionable material required for penetrating weapon of the present design. However, this economic factor must not be permitted to overshadow the operational need for military weapons to produce damage of the type desired. While the economic and technical aspects must be carefully considered, in the final analysis the military operational requirements of deliverability, accuracy of delivery, and ability of the weapon to produce the results required, are of paramount importance.

c. Consequently, the reader is urged to weigh carefully these considerations before rendering judgment on the merits of the penetrating weapon versus the surface burst weapons.

2. Comparison of Results.

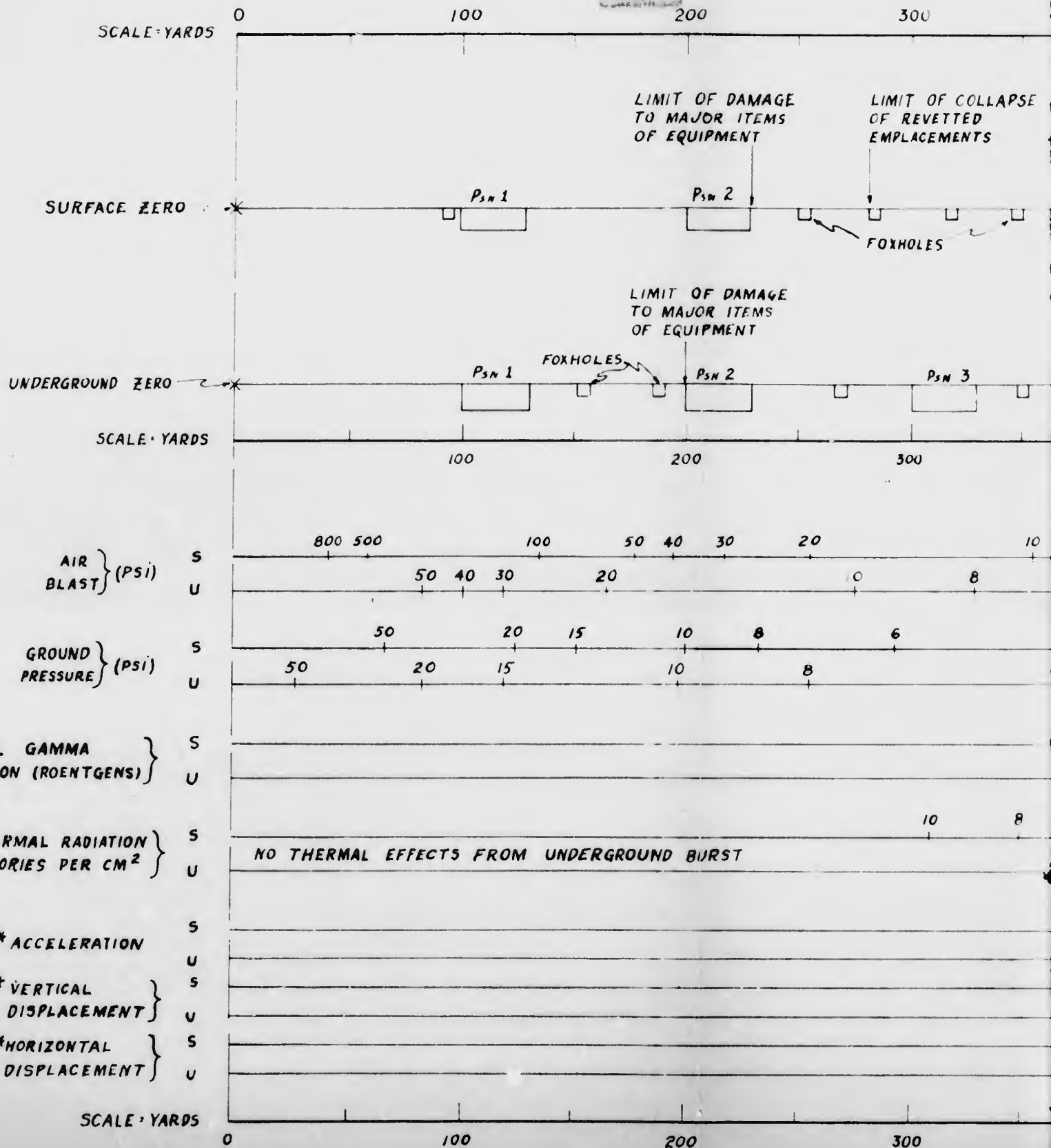
a. Correlated Comparison of Damage and Causative Factors.

(1) The following chart (Fig. 13) shows in a brief comparative manner the damage experienced in each of the tests. Included also is a comparison of the major effects, as a function

~~SENSITIVE DATA~~ convenient reference

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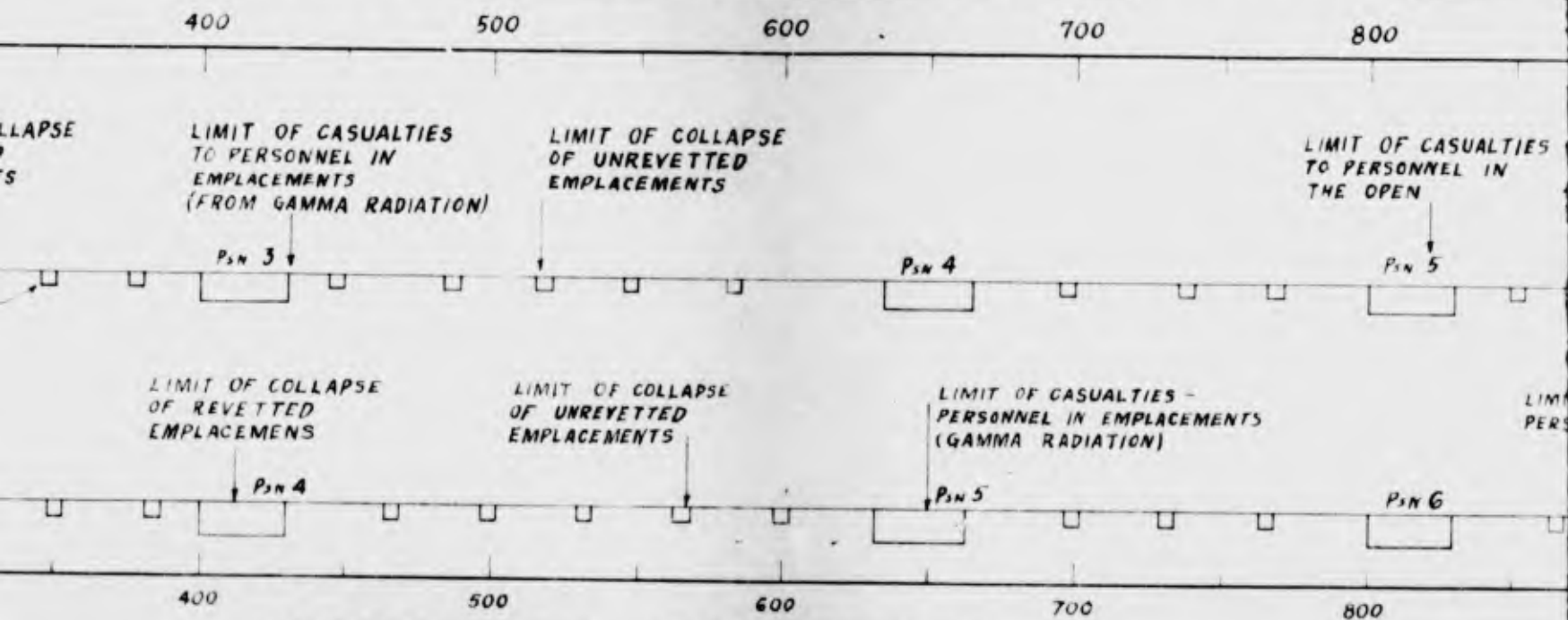


* NOTE: THIS INFORMATION NOT AVAILABLE AT THIS TIME.

7

COMPARISON OF RESULTS SURFACE AND UNDERGROUND SHOTS

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COMPARISON OF EFFECTS

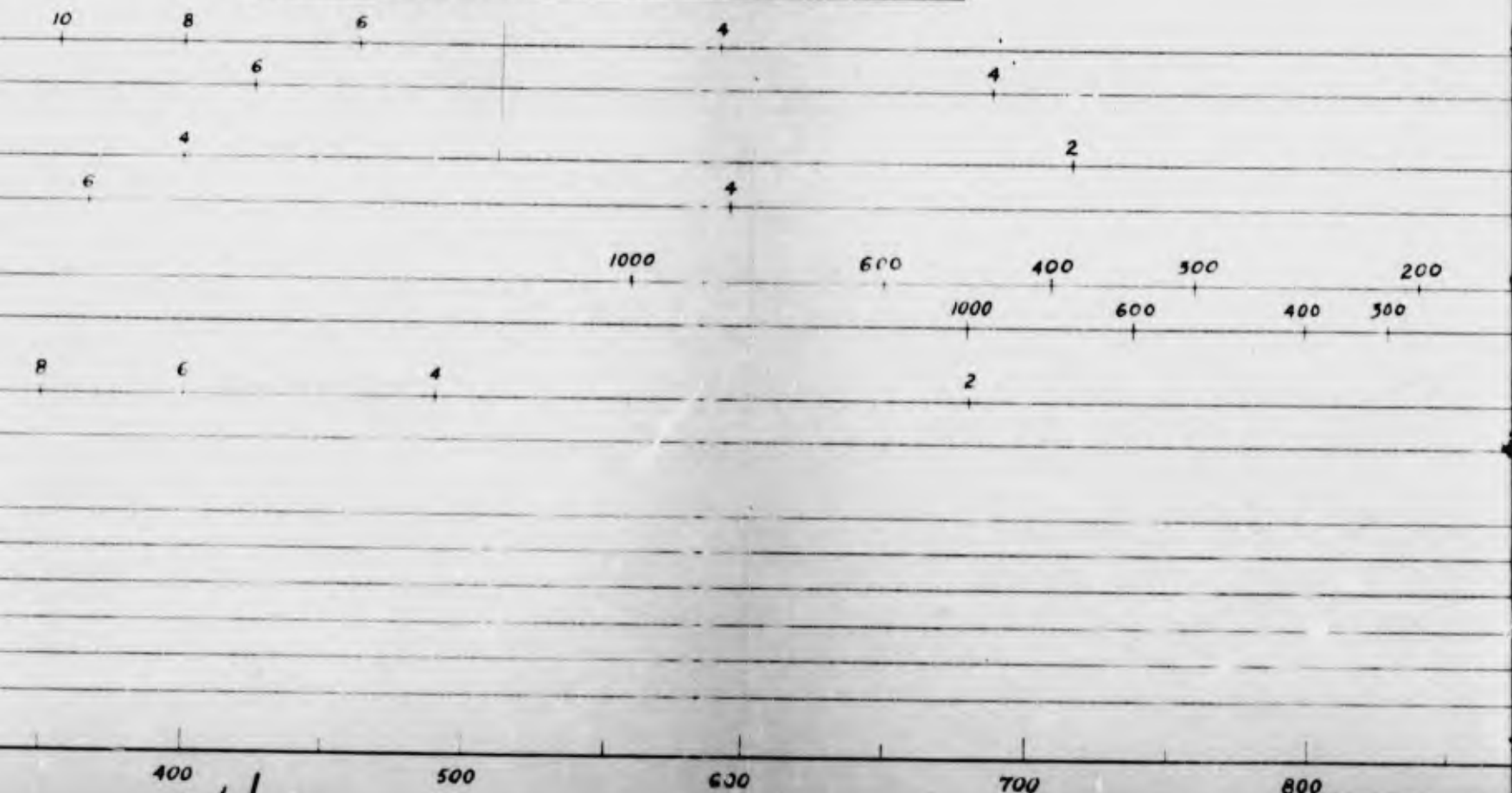


FIGURE 13

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LTS
SHOTS

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700

800

900

1000

1100

LIMIT OF CASUALTIES
TO PERSONNEL IN
THE OPEN

PSN 4

PSN 5

PSN 6

LIMIT OF CASUALTIES -
PERSONNEL IN EMPLACEMENTS
(GAMMA RADIATION)

LIMIT OF CASUALTIES -
PERSONNEL IN THE OPEN

PSN 5

PSN 6

PSN 7

700

800

900

1000

CTS

2

4

2

2 (Psi) AT 1420 YARDS

00

400

300

200

100

50

1000

600

400

300

200

100

2

700

800

900

1000

1100

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b. Discussion of the various effects.

(1) Air blast. It is noted in Figure 13 that the air blast from the surface shot was higher than for the underground shot down to the region of 6 psi. Also, that for lower values of overpressure, the reverse is true. This is contrary to expectations, since the surface burst air blast pressures were expected to exceed those of an underground burst. This anomaly is unexplained at present, but may possibly be explained later after more careful analyses of the scientific results have been made.

(2) Ground pressure. The peak ground pressures resulting from these two shots vary roughly in the manner expected, with the underground shot giving higher pressures than the surface shot at the various distances. The validity of this statement is substantiated by the fact that the emplacements suffered severe damage at greater distances in the case of the underground shot.

(3) Thermal radiation. From the standpoint of thermal radiation (heat), these types of burst exhibit markedly different characteristics. The surface burst produced significant burning effects out to fairly large distances which contributed to the casualty-producing effect of such a weapon. The thermal effects of an underground burst, on the other hand, are dissipated in the earth surrounding the weapon and are of negligible importance from the military standpoint.

(4) Nuclear radiation. The significant comparison is that the underground burst produced a radiation hazard greater than twice that of the surface shot. The lethal range of the initial radiation was greater in the case of the underground explosion, and the area of serious residual contamination was more than twice as large. A respiratory problem from radioactive dust existed following the underground explosion, but not following the surface explosion. The degree of radiation protection afforded by

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field emplacements was less against the passage of a low radioactive cloud than against the radiation emitted by the swiftly rising fireball of a surface shot. The fact that 14 of 46 animals exposed during the "U" detonation died within eight days serves to emphasize the radiation effects. Contamination of equipment and food that could be removed from the area did not present a serious military problem.

3. Limitation of the Tests.

a. The test weapons were of a very low yield (1 KT). This, coupled with the fact that the scaling laws for the various effects are not fully known, limits extrapolation of the results to the yields of the operational weapons.

b. The weapon effects information supplied by the Effects Tests Group of Operation JANGLE upon which some of this report is based, is preliminary in nature and may need to be modified when a more detailed analyses of their results have been made.

c. The type of soil and flat, treeless terrain of the Nevada Test Site is such that it may be difficult to predict the effects against similar targets on other terrain and in other soils.

4. Conclusions.

a. Conclusions relative to the effects test.

Conclusion relative to surface burst, see Part II, Sec. A, par 3.

Conclusion relative to underground bursts, see Part III, Sec. A, par 3.

(1) The greater amount of damage to the major items of materiel and equipment from both the surface and underground bursts resulted from the air blast.

(2) The thermal effects of the surface shot would contribute to personnel casualties in the open, but produced only negligible damage to materiel and equipment. There was no thermal damage from the underground shot.

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(3) The gamma radiation effects provided the principal hazard to personnel.

(4) Normal field emplacements provide about 80% protection against the nuclear radiation effects of surface and underground bursts.

(5) The contaminating effects of surface and underground bursts are such as to preclude occupancy of relatively large areas for periods of several days after the burst. However, a unit could pass through the edges of the area fairly soon after the burst.

(6) The effects of contamination of military equipment and materiel do not pose a serious operational problem.

(7) Specially designed field emplacements for atomic warfare are not justified.

(8) Food and water in closed, intact containers following an atomic explosion are usable.

(9) It is felt that the results of Desert Rock Exercises I, II and III provide adequate information as to the protection afforded by normal field emplacements in this type of terrain and soil.

b. Conclusions relative to the test operation.

(1) The concept of providing pre-shot and post-shot observer indoctrination is sound in view of the excellent contrasting results.

(2) The three (3) roentgen tolerance level established is too low for practical military test requirements.

(3) The RadSafe program for test personnel would have been more efficient from the point of view of military participation had it been under complete military control.

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5. Recommendations.

a. As regards effects tests.

(1) As soon as scaling law information becomes available, appropriate portions of this report should be reviewed by the Department of the Army so as to reflect the effects of the operational weapon.

(2) Prior to the conduct of future tests, a careful study of past experience and existing test data should be made. These results should be summarized and promulgated to future test agencies in ample time for use in connection with test planning. This procedure ^{may well} ~~will~~ minimize unnecessary and costly duplication and some uncertainty in the conduct of future tests.

(3) Items selected for test should be typical of those which are of major importance in the analyses of targets. Miscellaneous small items should not be included unless justification for tests of these items is evident after careful coordination and planning, to include technical services involved.

b. As regards test operations.

(1) The observer indoctrination program be reviewed by AFSWP for scope content and time allotment.

(2) Observer attendance at low yield nuclear explosions should be limited to personnel from those agencies directly concerned. Maximum observer attendance is recommended for all tests involving operational yield weapons.

(3) Department of the Army to review the radiation dosage information available and to establish for test operation an approved military operational dosage which should have the general concurrence of the Atomic Energy Commission.

(4) Staff to conduct future Army participation in atomic operations should be as well trained basically and as self-sufficient as possible from the points of view of indoctrination,

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radiological safety, monitoring, and other technical aspects. Such a procedure would facilitate the Army control of its own radiological safety program.

(5) No changes are recommended at this time in design or construction of standard emplacements, clothing, equipment, and materiel tested, but the possible needs in this connection should be subject to continuing review.

(6) No change be made in the basic doctrine of employment of troops in attack or defense, except that emphasis should be placed upon digging-in and the dispersion of reserves.

(7) A revitalized course in atomic weapons as an important part of the Department of the Army training program, particularly as it pertains to atomic weapons effects and individual protective measures, to be instituted with careful planning and thorough supervision. The objective of this training should be the thorough indoctrination of all personnel in the capabilities and limitations of all types of atomic weapons explosions.

(8) Consideration should be given to conducting future tests in types of terrain, such as rolling or hilly country and wooded areas in which operations might normally be conducted. More pertinent data could be thus secured than has been obtained to date from conduct of exercises in flat terrain. For instance, in operations Desert Rock II and III, a more rolling terrain was available in the same general vicinity.

(9) The Armed Forces to take advantage of every opportunity in the future to participate more actively in the operation of atomic tests, including complete control of certain special tests by the Armed Forces.

(10) Advantage should also be taken of every opportunity to include troop participation, tactically and experimentally, in future atomic exercises.

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(11) Final conclusions as to tactical employment and comparative effectiveness of surface and underground weapons should be withheld where obviously appropriate until a re-evaluation of this report has been made in terms of the estimated yield of the operational weapon.

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