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SWPEF-5-353.2 X920

21 APR 1954

SUBJECT: Criteria for Exposing Personnel to the Effects of Atomic Weapons During Training Exercises

10734 83875

TO: Assistant Chief of Staff, G-3
Department of the Army
Washington 25, D. C.

Cross-Reference Made For Central Files

1. Reference is made to your disposition form file G3 354.2 (30 Oct 53) which requested AFSWP comments and recommendations on proposed criteria and troop positions for future CONUS atomic tests.

2. The suggested criteria for blast overpressures, ground particle velocity, and thermal radiation appear well below damage-producing thresholds. The criterion for neutron radiation has no usable significance because a rem of neutrons has not yet been defined for man. With an allowance of only 10 r of initial gamma radiation, however, the neutron radiation will seldom, if ever, be the limiting exposure criterion.

3. There is no argument to indicate that the total allowed radiation exposure of 20 r will give rise to any acute symptoms. The AFSWP would be remiss, however, if it did not invite attention to the fact that there is much evidence to suggest that exposure to radiation, either chronic or acute, may possibly give rise to degenerative or malignant disease with latent periods of as long as 20-30 years or more. In the field of medical radiation exposure and health physics, one therefore operates under the assumption that radiation doses will be kept as low as possible and will never be increased merely for convenience. If this philosophy is adopted by exercise commanders, Rad Safe or troop orientation exposures should be kept as low as is consistent with rewarding participation. In general, a limitation on further participation even in the face of added logistic or monetary requirements is preferable to the raising of allowable exposure criteria for the general participation of a large number of personnel. The criteria stated in TM 23-200 are based on combat conditions and ignore the possibility of long term effects occurring in a limited number of people. It is suggested that this be a factor of consideration in arriving at a final decision of what criteria to adopt.

4. The recommended troop positions stated in paragraph 2 of the enclosure agree with the range of the effects as determined by the above

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higher tolerances during peacetime exercises.

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SUBJECT: Criteria for Exposing Personnel to the Effects of Atomic Weapons During Training Exercises

criteria, computed from TM 23-200 and modified in the case of troops in trenches and fighting positions by an additional safety factor of 750 yards. Attention is invited to the statement of applicability accompanying figure 11, TM 23-200. For yields up to 40 KT, the curves provide an accuracy of ± 15%; for yields greater than 40 KT, scaling will be less accurate. The proposed troop positions do not allow for this possible variation. It is assumed the additional 750 yards safety margin for entrenched troops is for the purpose of compensating for variations of yield. On that assumption, this figure is sufficient to protect against any variation that past history leads one to expect. For future developmental shots, however, there is no assurance that variation in yield may not be higher.

5. For troops in tanks or covered vehicles in the open, the limiting ranges listed by OCAFF seem to be based upon a radiation protection factor of 8. Although a factor of 8 for this type of vehicle is listed in TM 23-200, it represents an average value and should not be taken as the factor to be used in all armored vehicles in all orientations. In Operation GREENHOUSE, for example, protection factors as low as six were recorded for certain positions in M-46 tanks oriented side on. For other lighter armored vehicles, the protection may be even less.

6. Attention is also invited to the existing possibility that unpredicted wind shifts may occur which, in the case of tower shots, will create the likelihood of the troops exceeding the tolerance dosage of residual radiation. Close liaison should be maintained with the test Director and the AEC meteorological agency to provide for cancellation of the shot or the exercise on short notice.

7. The verification of the proposed troop positions has been done with respect to air burst and tower shots only. Due to the many variables influencing ground residual contamination, it is not considered practicable to establish troop positions for exercises involving surface or underground shots.

8. The above comments are only based upon technical considerations of weapon effects. Evaluation of operational aspects and possible errors in air drops is not properly within the mission of this headquarters.

DISTRIBUTION:
Cys 1&2A - ACoS, G-3, D/A
3,4,5A - AG
6A - EF-4 Files

H. H. RANKIN
Lt. Colonel, AGC
Adjutant General

OFFICE SYMBOL	1. SWPEF	2. SWPDR	3. SWPSV	4. SWPOT	5. SWPAG
GRADE & SURNAME OF COORDINATING OFFICERS	Davison	H. Seeville	C/S	Prince	Sabin
	LT Borg			Jones	
	Miller			Miller	

M/R: This is in reply to AG R&CS #48746. This req fr G-3 similar to one preceeding Desert Rock V (U-K) in which Defense Div did staff study which provided basis of D/A(Exercise Comdr) criteria. Comments re late effects will be amplified and documented in separate memo for the files to be prepared by Lt. Borg. This particular matter discussed in detail with Lt. Borg and Maj Miller, both of whom feel rather strongly that AFSWP should go on record now while there is the beginning of a trend on the part of the individual Services toward permitting

CDR Davison/52724/ajk/1B697
4/8/54

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ASSIFICATION (If any)

DISPOSITION FORM

[redacted]

FILE NO.	SUBJECT
G3 354.2 (30 Oct 53)	Criteria for Exposing Personnel to the Effects of Atomic Weapons During Training Exercise

TO C/AFSWP FROM G3 DATE 9 Feb 54 COMMENT NO. 1

Lt Col R.P. Young/52779/jo

1. At DESERT ROCK V the positioning of troops and observers was controlled by the instruction set forth in inclosure 1. As a result of using this criteria, it was found that the nuclear radiation limitation was too low to permit the troops and observers to spend sufficient time in the contaminated areas for the purpose of observing equipment displays and/or conducting maneuvers.

2. In reviewing this matter the Chief of Army Field Forces has recommended adoption of the criteria contained in inclosure 2.

3. Your comments and recommendations on inclosure 2 are requested to include:

a. The effect on personnel exposed to the criteria recommended in paragraph 1.

b. The degree of safety offered by positioning troops as recommended in paragraphs 2 and 3 assuming the criteria for exposure in paragraph 1 is adopted.

c. Any other comment or recommendation which you consider pertinent.

FOR THE ASSISTANT CHIEF OF STAFF, G-3:

T. W. Dunn

T. W. DUNN, Brigadier General, GS
Chief, Organization and Training Division

2 Incl
1. Instr for Posit DA Pers at Continental Atomic Tests 20 Feb 53
2. OCAFF Recm Criteria for Exposure of Pers to Atomic Wpns Effects in Future CONUS Atomic Tests

Declassified by DNA, Chief, ISTS
with Inclosures
Robert L. Pepper
DATE: 8/22/94

[redacted]

DD FORM 1 FEB 50 96 REPLACES NME FORM 96, 1 OCT 48, WHICH MAY BE USED. 16—54801-3 U. S. GOVERNMENT PRINTING OFFICE

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20 Feb 53

INSTRUCTIONS FOR POSITIONING DA PERSONNEL AT CONTINENTAL ATOMIC TESTS

1. Troops and troop observers.

a. The following criteria has been established as the maximum limit to which Department of the Army personnel will be exposed while participating in peacetime field exercises conducted in conjunction with atomic weapons tests.

(1) Overpressure -- five (5) pounds per square inch.

(2) Nuclear radiation -- six (6) roentgens at any one test, of which no more than three (3) roentgens is prompt, whole body radiations; provided further that no individual will receive more than six (6) roentgens in any six months period.

(3) Thermal radiation -- one (1) calorie per square centimeter.

b. On the basis of the above exposure limits the following troop positioning criteria will be utilized for Department of the Army personnel.

(1) For tower shots.

Max Predicted Yield	Troops in Open	Troops in Trenches
1 to 5 KT	4500 yds	3500 yds
5 to 10	6500	3500
10 to 15	8000	3500
15 to 20	9000	3500
20 to 25	10,000	3500
25 to 30	11,000	3700
30 to 35	12,000	3800
35 to 40	12,500	4000

(2) For 280mm gun delivered missiles -- add 1000 yards to distances given for tower shots.

(3) For aircraft delivered bombs -- add 3000 yards to distances given for tower shots.

(4) Troop and observer positions will be located so that a gun or aircraft delivered weapon is delivered along a line in front of and parallel to the positions.

(5) Trenches provided for troops and observers must be at least six (6) feet deep and all participants will be instructed to keep

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[illegible] feet below [illegible] level.

(f) Positions for troops in the open will be chosen so as to preclude injury from flying debris.

c. Except as provided in paragraph 2 below, the Exercise Director is not authorized to position personnel closer to ground zero than provided in paragraph 1b above. The Exercise Director is authorized to station all or part of the troops and troop observers at distances from ground zero greater than provided in paragraph 1b above under the following circumstances

(1) In the event an adequate evacuation plan cannot be implemented from the positions specified.

(2) In the event special circumstances arise at the test site which, in the opinion of the Exercise Director, would jeopardize the safety of personnel if located at the specified positions.

2. Selected Volunteers.

a. In order that this series of tests may develop the maximum amount of data that can be made applicable to subsequent DESERT ROCK exercises, the Exercise Director is hereby given discretionary authority on tests subsequent to the first one of the DESERT ROCK V series to position selected individuals at points closer to ground zero than the distances provided in paragraph 1b above, but in no case closer than 1500 yards. The use of such discretionary authority will be based upon observed results of the first test.

b. The individuals selected to participate in such an operation, not to exceed twelve (12) in number for any one test, must have sufficient indoctrination in weapons effects to be fully aware of all of the risks involved in exposure of this nature including possible latent effects, and must volunteer for such duty. Furthermore, they should be familiar in detail with the nature of the experimental explosion involved and be capable of making a personal assessment of the probability of significant variations in yield.

c. It is not intended that these exposures result in any injury to the selected individuals, but rather that their reactions to the experiments be gained for use as a basis for development of later troop exposure programs and for confirming safety doctrine for tactical use of atomic weapons.

d. In the exposure of selected individuals as authorized above, it is desired that the following limits of exposure not be exceeded, in each case assuming that the individual is crouched in the bottom of a fox hole at least six (6) feet deep.

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OCAFF RECOMMENDED CRITERIA FOR EXPOSURE OF PERSONNEL TO ATOMIC WEAPONS EFFECTS IN FUTURE CONTINENTAL US ATOMIC TESTS

1. Criteria for exposure of troops to atomic weapons effects.

   a. Nuclear radiation (cumulative).

      (1) Gamma

         (a) Prompt - Ten roentgens.

         (b) Residual - Ten roentgens.

      (2) Neutron - Five rem

   b. Blast (overpressure) - Five psi.

   c. Ground particle velocity - .2 fps.

   d. Thermal radiation - 0% casualties at $1\frac{1}{2}$ Cal/Cm^2, infinite visibility.

2. Troop positions for tower shots.

Max Predicted KT Yield	Range Troops in Open	Range * Troops in trenches or fighting positions
20 KT	6200 yds	2580 yds
30	7600	2720
40	8200	2810
50	9700	2860
60	10,500	2900

* Includes 750 yd additional safety factor.

3. Troops in tanks or covered armored vehicles in open for tower shots (assuming height of bursts are such that no effective precursor results)

Max Predicted KT Yield	Range *
20 KT	2750 yds
30	3230
40	3300
50	3370
60	3440

The above distances can be reduced considerably for tanks by placing them in defilade or by so orienting them so that maximum armor faces the blast.

* Includes 750 yd additional safety factor.

4. For aircraft delivered weapons: add 1,000 yards to distances given in paragraphs 2 and 3 above.

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AFSWP ROUTING AND CONTROL SHEET

NOTE: This Routing and Control Sheet will remain attached to this communication until all action required is completed. After action has been completed it will be filed in the Adjutant General's Office.

	TO:	INITIALS	DATE		FOR
	CHIEF, AFSWP				APPROVAL
	DEPUTY CHIEF, USA				COMMENT
	DEPUTY CHIEF, USN				CONCURRENCE
1/A	~~CHIEF STAFF~~				INFORMATION
	DCS/OPERATIONS				NECESSARY ACTION
	CHIEF, PLANS AND RQMTS				NOTE AND FORWARD
1	CHIEF, OPNS AND TNG Has seen				NOTE AND RETURN
	DCS/ADMINISTRATION			1-5	COORDINATION
	CHIEF, SECURITY				FILE IN AGO
	CHIEF, PERSONNEL				SIGNATURE
	CHIEF, LOGISTICS				
4/3/4	DCS/TECHNICAL SERVICES		4-20		
	CHIEF, WPNS DEV				
3	CHIEF, WPNS EFFECTS				
	CHIEF, WPNS DEFENSE				
	CHIEF, WPNS TEST				
5	ADJUTANT GENERAL				
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	SPECIAL ASST TO CHIEF, AFSWP				
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2	Technical Director		15 Apr		

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(cy 6A WD EF-4 Files)
~~Inclosed Draft by [illegible]~~

FROM: SPWEF-5

DATE: 8 Apr 54

SUBJECT OR SUMMARY OF THE COMMUNICATION

Criteria for Exposing Personnel to the Effects of Atomic Weapons During Training Exercises.

REMARKS

Cy 6A retained in EF-4 files
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Date: 8/22/94

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AFSWP FORM 4
1 OCT 52

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GPO 16—67612-1