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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS STRATEGIC AIR COMMAND
OFFUTT AIR FORCE BASE NEBRASKA 68113

REPLY TO ATTN OF: LGW

19 NOV 1980

SUBJECT: Intermagazine Separation Distance in Dense Vegetation Growth

TO: 3AD/LGW

The attached correspondence approves application of AFR 127-100, Table 5-4, Column 8 for bomb storage pads separated by dense jungle growth of at least 2000 grains/ft^3. This policy means that jungle growth can be considered as a 100% barricade instead of the previously stated 80%. DDESB-KT Ltr, 27 Jul 76, Magazine Separation Distance in Jungle Growth (attached), paragraph 5, provides specifics for this provision.

GEORGE J. CRAWFORD, USAF
Deputy Director of Munitions
DCS Logistics

2 Atchs
1. HQ AFISC/SEV Ltr, 7 Nov 80
2. DDESB-KT Ltr, 27 Jul 76

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE INSPECTION AND SAFETY CENTER
NORTON AIR FORCE BASE, CALIFORNIA 92409

7 NOV 1979

SEV

Intermagazine Separation Distance in Dense Vegetation Growth

HQ AAC/IGF/LGW
HQ AFLC/IGF
HQ AFSC/IGF
HQ PACAF/IGF/LGW
HQ SAC/LGW
HQ TAC/SEM/LGW
HQ USAFE/IGF/LGW

1. The attached decision was made by the Department of Defense Explosives Safety Board (DDESB) concerning the effectiveness of dense vegetation in preventing communication of an explosion between unbarricaded storage revetments (pads) containing bombs and other relatively insensitive munitions.

2. Approval is granted to apply the barricaded intermagazine distance specified in Column 8 (K6), Table 5-4, AFR 127-100, between unbarricaded pads separated by acceptable vegetation and subject to the limits imposed by the DDESB.

JAMES E. MCQUEEN, Colonel, USAF
Chief, Weapons Safety Division
Directorate of Aerospace Safety

1 Atch
DDESB-KT Ltr, 27 Jul 76, Magazine Separation Distance in Jungle Growth

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
WASHINGTON, D.C. 20314

DDESB-KT

27 July 1976

SUBJECT: Magazine Separation Distance in Jungle Growth

AFISC/SEV
Norton AFB, CA 92409

1. Reference:

a. IGD/SEV letter to Chairman, DDESB dated 6 July 1976, subject: Proposed DDESB Survey of PACAF Command Bases.

b. 61 JTCG/ME-70-5, Single Fragment Performance in Grass and Jungle Tangle Environments, 1 September 1970 (CONF).

2. Reference 1a requests an evaluation of the effectiveness of dense vegetation in inhibiting communication of explosion between otherwise unbarricaded aboveground storage of ammunition, for possible application to open storage of bombs at Andersen Air Force Base, Guam. It recommends that the barricaded magazine separation distance of 6 ft/lb$^{1/3}$, about half the unbarricaded distance of 11 ft/lb$^{1/3}$, be permitted between such locations. This possibility has been studied on the basis of the experimental results for fragment retardation in jungle growth reported in reference 1b.

3. In reference 1b, it was found that the decrease of fragment velocity with distance through vegetation can be represented satisfactorily by a simple exponential law just as for the passage of fragments through air. The stopping distance, defined as the distance within which the velocity is reduced to, say, half its initial value, is inversely proportional to the gross average density of the medium and to a drag coefficient which depends on fragment shape. Values of drag coefficient for fragments passing through vegetation were experimentally determined to be slightly smaller than corresponding values through air at fragment speeds greater than about 2000 fps, offsetting somewhat the greater stopping power due to the higher density of the medium.

4. The mechanism of primary fragment impact is considered to be by far the predominant agent of communication of explosion between open stores of bombs. Separation of such stores at approximately half the unbarricaded

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SUBJECT: Magazine Separation Distance in Jungle Growth

distance normally required can be justified if it can be shown that the stopping distance through vegetation is less than half the corresponding distance through air. Review of the results reported in reference 1b indicates that this will be ensured provided the gross average density of the medium is at least 2000 grains/ft^3, or about four times the density of air at standard conditions.

5. Accordingly, pads for storage of ammunition in the open at Andersen Air Force Base may be considered barricaded provided the gross average density of vegetation in the space between stacks of munitions is at least 2000 grains/ft^3. This relaxation of magazine separation standards will be limited, however, to the storage of relatively insensitive finished ammunition such as bombs and separate-loading projectiles, without fuzes or propelling charges. Additionally, any structures built to shelter the ammunition will be of frangible, insubstantial construction.

6. Attention is invited to the experiments and analysis reported in reference 1b for detailed technical support of this relaxation of standards, and for a description of the method used to determine the gross average density of vegetation *in situ*. If jungle growth is relied upon to provide protection between storage locations over a sustained period, a regular program of surveillance should be instituted to insure that the degree of protection is not seriously impaired by actions such as clearance of a corridor through the growth to accommodate utilities or other rights of way.

P. F. KLEIN
Captain, USN
Chairman