



DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600

20 August 1998

DDESB-IK

MEMORADUM FOR ARMY BOARD MEMBER, COL JAMES KING, USA
NAVY BOARD MEMBER, CAPT BILL WRIGHT, USN
AIR FORCE BOARD MEMBER, MR. PAUL PRICE
MARINE CORPS BOARD MEMBER, MR. GARY CARLSON

SUBJECT: 316TH Board Meeting

The Department of Defense Explosives Safety Board (DDESB) held its 316th meeting on 18 and 19 August 1998. The Board approved one change to DOD 6055.9-Std. This change is outlined below and is effective immediately.

a. The Board approved the complete revision of Hazard Division (HD) 1.2 quantity-distance (Q-D) criteria and related HD 1.1 minimum hazardous fragment distance criteria in DoD 6055.9-STD as well as editorial changes taking into account the new HD 1.2 sub-division notation. The changed sections to DoD 6055.9-STD, listed below, are at attachment A.

(1) HD 1.2 criteria – Subsection C.2 and Tables 9-6 (A&B) through 9-9, Chapter 9.

(2) Editorial changes – Subsection A.3 and Table 3-6 (and Notes) Chapter 3; Table 8-2, Chapter 8; and subparagraphs B.1.c, B.1.e, B.1.f, B.1.h, B.1.j, and D.1.b (1), and Key to Table 9-14, Chapter 9.

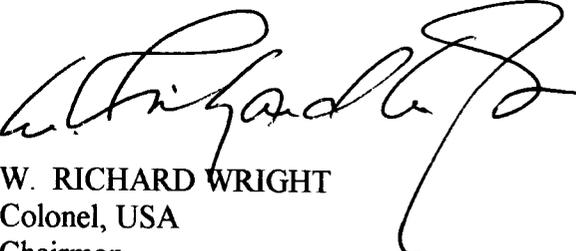
(3) HD 1.1 minimum hazardous fragment distance criteria – Subparagraph E.2.c.(1).(b), Chapter 2; subparagraphs E.2.b, Chapter 5; Notes for Table 9-1, Chapter 9.

b. The Board directed that the Services take the actions necessary to expeditiously implement the above changes to HD 1.2 and HD 1.1 standards. These changes must be completely implemented no later than 1 October 2003. The Board also directs that each Service report the status of implementation annually on 1 October with the first report due on 1 October 1999 until completion. The Board encourages full implementation prior to 1 October 2003.

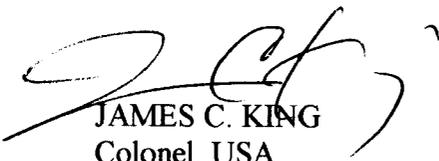
c. The Board conceptually agreed to a complete revision of Chapter 10, DoD 6055.9-STD "Theater of Operations Quantity-Distance" renamed to "Contingency and Combat Operations." The revised Chapter 10 will be edited and sent to the Board members by 28 August 1998 for final review and approval. Voting on the final version will be by correspondence. The final vote should be completed by 1 October 1998.

3241

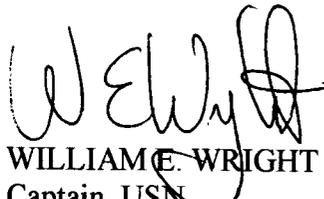
d. Additionally, the Board approved the Charter (for follow-on Phase II) and the Fiscal Year 1999-2000 plan of action and milestones for the DDESB Risk-Based Explosives Safety Criteria (RBESC) Working Group chaired by Mr. Paul Price, USAF Board Member. The Board agreed to continue the level of effort and funding at the Fiscal Year (FY) 1998 amount through FY 99. The RBESC Charter for Phase II signed by the Chairman is at attachment B.



W. RICHARD WRIGHT
Colonel, USA
Chairman



JAMES C. KING
Colonel, USA
Army Member



WILLIAM E. WRIGHT
Captain, USN
Navy Member



PAUL PRICE
Air Force Member



GARY CARLSON
Marine Corps Member

Attachments
As stated

ATTACHMENT A

2. Hazard Division 1.2 (Tables 9.6 through 9.9)

a. HD 1.2 are items configured for storage and transportation that do not mass detonate when a single item or package in a stack is initiated. Explosions involving the items result in their burning and exploding progressively with no more than a few at a time reacting. These reactions will project fragments, firebrands, and unexploded items from the explosion site. Blast effects are limited to the immediate vicinity and are not the primary hazard.

b. The Net Explosive Weight (NEW) of an item (used for transportation) is the sum of the weight of the HD 1.1 and 1.3 material contained in an item. The Net Explosive Weight for Quantity Distance (NEWQD) for an item is equal to NEW (NEWQD = NEW) unless testing has been conducted. Based on testing, the NEWQD may include a reduced contribution (less than or equal to 100%) from the HD 1.3 material as a result of the HD 1.1 material being functioned. The NEWQD should be determined by the Single Package Test (UN Test 6 (a) or its equivalent), not the Bonfire Test (UN Test 6 (c)). The NEWQD for a specific item may be obtained from the Joint Hazard Classification System (JHCS). The effects produced by the functioning of HD 1.2 items vary with the size and weight of the item. HD 1.2 ammunition is separated into two subdivisions in order to account for the differences in magnitude of these effects for purposes of setting quantity-distance criteria. The more hazardous items are referred to as HD 1.2.1 items and have an NEWQD greater than 1.60 pounds. The less hazardous items, referred to hereafter as HD 1.2.2, have an NEWQD less than or equal to 1.60 pounds. These two HD 1.2 subdivisions are shown below with their definitions:

HD 1.2.1:	NEWQD > 1.60 pounds
HD 1.2.2:	NEWQD ≤ 1.60 pounds

It is important not to exaggerate the significance of the value of 1.60 pounds used above. It is based on a break point in the database supporting the quantity-distance relationships and tables and the NEWQD of the rounds tested. If comprehensive data are available for a particular item, then the item may be placed in that category of HD 1.2 supported by the data and allocated the relevant quantity-distances.

c. The Maximum Credible Event (MCE) is the NEWQD for a single donor multiplied by one (1) plus one-half (1/2) times the number of acceptors required in the UN Test 6 (b) Stack Test (Note: An approved lesser weight may be used if it has been demonstrated by testing or analogy.). The MCE for a specific item may be obtained from the Joint Hazard Classification System (JHCS).

d. The quantity distances specified for HD 1.2 ammunition achieve the desired degree of protection against immediate hazards from an incident. Events involving HD 1.2 items lob large amounts of unexploded rounds, components, and subassemblies, which will remain hazardous after impact. Such items are likely to be more hazardous than in their original state because of possible damage to fuze safety devices or other features by heat and impact. Many types of ammunition containing sub-munitions, such as cluster bombs, can be expected to be projected out to distances as great as the relevant inhabited building distances. Furthermore, it is impractical to specify quantity distances which allow for the maximum possible flight ranges of propulsive items.

e. Tables 9.6A and 9.6B and Table 9.7 provide the appropriate inhabited building distances (IBD), public traffic route distances (PTR), and intraline distances (ILD) for HD 1.2.1 and HD 1.2.2 ammunition, respectively. When HD 1.2.1 items are stored in structures which may contribute to the debris hazard, the IBD is determined by using the larger of the following two distances: either that given in Table 9.6A for the appropriate Explosive Weight (number of items x NEWQD) or that given in Table 9.6B for the appropriate MCE.

f. Intermagazine distances (IMD) are dependent upon the types of structures acting as both the Potential Explosion Site (PES) and the Exposed Site (ES). Table 9.8 provides a matrix of all the appropriate separations for the various combinations of ES and PES.

g. PTR distances given in Tables 9.6, 9.7 and 9.8 give consideration to the transient nature of the exposure in the same manner as for HD 1.1. PTR distance is computed as 60% of the IBD for items in this hazard division.

h. ILD given in Tables 9.6 and 9.7 and 9.8 take into account the progressive nature of explosions involving these items (normally resulting from fire spread), up to the magnitude of the MCE, and the ability to evacuate personnel from endangered areas before the progression involves large numbers of items. Exposed structures may be extensively damaged by projections and delayed propagation of explosions may occur due to the ignition of combustibles by projections. ILD is computed as 36% of the IBD for items of this HD, with a minimum distance equal to the Intermagazine Distances given in Table 9.8.

i. When storing mixed sub-divisions of HD 1.2 ammunition (HD 1.2.1 and HD 1.2.2), the following rule shall apply: Consider each sub-division separately and apply the greater of the two distances. The general mixing rules for HD 1.2 ammunition are given in Table 9.9.

j. For reasons of operational necessity, limited quantities of HD 1.2.2 items may be stored in facilities such as hangars, troop buildings, and manufacturing or operating buildings without regard to quantity distance. Fragmentation shielding will be provided.

k. Unit Risk HD 1.2 is a special storage sub-division (HD 1.2.3) for ammunition that satisfies either of the following sets of criteria:

- (1) Ammunition that satisfy the criteria for HD 1.6 with the exception of containing a non-EIDS device, or
- (2) Ammunition that does not exhibit any sympathetic detonation response in the stack test (United Nations (UN) Tests 6(b) or 7(g)) or any reaction more severe than burning in the external fire test (UN Test 6(c) or 7(k)), bullet impact test (UN Test 7(j)), and the slow cook-off test (UN Test 7(h)).

l. The IBD for Unit Risk HD 1.2 (HD 1.2.3) is determined using Table 9-10 (Hazard Division 1.3 Quantity-Distances) for the NEWQD for the HD 1.2.3 item multiplied by the number of rounds with a minimum fragment distance based on the HD 1.1 hazardous fragment areal number density criteria applied to a single round of the HD 1.2.3 ammunition. The minimum fragment distance is specified in hundreds of feet in parentheses as "(xx) 1.2.3." PTR for Unit Risk HD 1.2 ammunition is based on 60% of IBD. ILD is computed as 36% of IBD, with a minimum distance equal to the Intermagazine Distances given in Table 9.8

m. For storage of mixed Unit Risk HD 1.2 (HD 1.2.3) ammunition, multiply the NEWQD for the HD 1.2.3 items by the corresponding number of HD 1.2.3 rounds and use Table 9-10 with a minimum fragment distance based on the largest minimum fragment distance for the HD 1.2.3 ammunition in storage. When HD 1.2.3 ammunition is located with any other Hazard Division 1.2 sub-division, use the distances given in Table 9.9. When HD 1.2.3 ammunition is located with any other HD ammunition, the HD 1.2.3 ammunition is considered HD 1.2 (HD 1.2.1 or HD 1.2.2, according to NEWQD) for quantity-distance purposes. The mixing rules provided in subsection B.1 above then apply to the combination of the hazard divisions.

n. HD 1.2 ammunition in the current inventory with IBD given in hundreds of feet and presented in parentheses in the format HD (xx)1.2, need not use the quantity-distance criteria specified above. Instead, constant value quantity-distance criteria for these items may be specified as follows: IBD is the distance specified in hundreds of feet (in parentheses); PTR is computed as 60% of IBD; ILD is computed as 36% of IBD, with a minimum distance equal to the Intermagazine Distances given in Table 9.8.

**TABLE 9.6A. HAZARD SUB-DIVISION 1.2.1 QUANTITY-DISTANCES
(IBD, PTR, ILD) FOR MUNITIONS WITH NEWQD > 1.60 POUNDS**

EXPLOSIVE WEIGHT ¹ (lbs)	IBD ^{2,3} (ft)	PTR ⁴ (ft)	ILD ⁵ (ft)	EXPLOSIVE WEIGHT ¹ (lbs)	IBD ^{2,3} (ft)	PTR ⁴ (ft)	ILD ⁵ (ft)
				7,000	1033	620	372
2	200	120	72	8,000	1055	633	380
5	200	120	72	9,000	1074	644	387
10	200	120	72	10,000	1091	654	393
20	200	120	72	15,000	1154	693	416
40	200	120	72	20,000	1199	719	432
60	200	120	72	25,000	1233	740	444
80	224	134	81	30,000	1260	756	454
100	268	161	97	40,000	1303	782	469
150	348	209	125	50,000	1335	801	481
200	404	242	145	60,000	1362	817	490
300	481	289	173	70,000	1384	830	498
400	535	321	193	80,000	1402	841	505
600	610	366	220	90,000	1419	851	511
800	662	397	238	100,000	1434	860	516
1,000	702	421	253	150,000	1489	894	536
1,500	774	464	279	200,000	1528	917	550
2,000	824	494	297	250,000	1558	935	561
2,500	862	517	310	300,000	1582	949	569
3,000	893	536	322	350,000	1601	961	577
3,500	919	551	331	400,000	1619	971	583
4,000	941	565	339	450,000	1633	980	588
5,000	978	587	352	500,000	1647	988	593
6,000	1008	605	363	>500,000	Note 3	Note 4	Note 5

NOTES

- (1) Explosive Weight = Number of Items x NEWQD
- (2) $IBD = -735.186 + [237.559 \times (\ln(\text{number of items} \times \text{NEWQD}))] - [4.274 \times (\ln(\text{number of items} \times \text{NEWQD}))^2]$
IBD in feet, NEWQD in pounds; ln is natural logarithm
- (3) Use of equation given in Note (2) to determine IBD ranges for other weights is allowed
- (4) PTR = 60% of IBD
- (5) ILD = 36% of IBD

GENERAL COMMENTS

- (a) When stored in structures which may contribute to the debris hazard, the IBD for items whose MCE is greater than 100 pounds is determined by using the larger of the following two distances: those given in this table for the appropriate Explosive Weight or those given in Table 9.6B for the appropriate MCE.

TABLE 9.6B. MINIMUM FRAGMENT DISTANCES FOR HD 1.2.1 ITEMS STORED IN STRUCTURES WHICH CAN CONTRIBUTE TO THE DEBRIS HAZARD

MCE (lbs)	MINIMUM FRAGMENT DISTANCE^{1,2} (ft)
100	670
125	744
150	815
175	875
200	927
225	973
250	1014
275	1051
300	1085
325	1116
350	1145
375	1172
400	1197
425	1220
450	1243
>450	1250

NOTES

- (1) Minimum Fragment Distance = $-1133.9 + [389 \times \ln(\text{MCE})]$;
MCE in pounds, Minimum Fragment Distance in feet with a minimum distance of 670 feet; ln is natural logarithm
- (2) Use of equation given in Note (1) to determine Minimum Fragment Distance for other MCEs is allowed

GENERAL COMMENT

- (a) When stored in structures which may contribute to the debris hazard, the IBD for items whose MCE is greater than 100 pounds is determined by using the larger of the following two distances: those given in Table 9.6A for the appropriate Explosive Weight or those given in this table for the appropriate MCE

**TABLE 9.7. HAZARD SUB-DIVISION 1.2.2 QUANTITY-DISTANCES
(IBD, PTR, ILD) FOR MUNITIONS WITH NEWQD ≤ 1.60 POUNDS**

EXPLOSIVE WEIGHT ¹ (lbs)	IBD ^{2,3} (ft)	PTR ⁴ (ft)	ILD ⁵ (ft)	EXPLOSIVE WEIGHT ¹ (lbs)	IBD ^{2,3} (ft)	PTR ⁴ (ft)	ILD ⁵ (ft)
1	100	60	36	7,000	366	220	132
2	100	60	36	8,000	376	226	135
5	100	60	36	9,000	385	231	139
10	100	60	36	10,000	394	236	142
20	100	60	36	15,000	427	256	154
40	113	68	41	20,000	451	271	162
60	123	74	44	25,000	471	282	169
80	131	79	47	30,000	487	292	175
100	138	83	50	40,000	514	308	185
150	152	91	55	50,000	535	321	193
200	162	97	58	60,000	553	332	199
300	179	107	64	70,000	568	341	204
400	192	115	69	80,000	581	349	209
600	211	127	76	90,000	593	356	214
800	226	136	81	100,000	604	362	217
1,000	238	143	86	150,000	647	388	233
1,500	262	157	94	200,000	678	407	244
2,000	279	168	101	250,000	703	422	253
2,500	294	176	106	300,000	723	434	260
3,000	306	183	110	350,000	741	445	267
3,500	316	190	114	400,000	757	454	272
4,000	325	195	117	450,000	771	462	277
5,000	341	205	123	500,000	783	470	282
6,000	355	213	128	>500,000	Note 3	Note 4	Note 5

NOTES

- (1) Explosive Weight = Number of items x NEWQD
- (2) $IBD = 101.649 - [15.934 \times \ln(\text{number of items} \times \text{NEWQD})] + [5.173 \times \ln(\text{number of items} \times \text{NEWQD})]^2$
IBD in feet, NEWQD in pounds; ln is natural logarithm
- (3) Use of equation given in Note (2) to determine IBD ranges for other weights is allowed
- (4) PTR = 60% of IBD
- (5) ILD = 36% of IBD

**TABLE 9.8. SUMMARY OF HAZARD SUB-DIVISIONS 1.2.1, 1.2.2, AND 1.2.3
QUANTITY-DISTANCES**

(note: all distances shown are in feet)

To EXPOSED SITE (ES)	From POTENTIAL EXPLOSION SITE (PES)						
	ECM			AGS (H)	AGS (H/R)	AGS (L)	
	S	R	F				
ECM (7 bar) (IMD)	S	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	R	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FU	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FB	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
ECM (3 bar) (IMD)	S	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	R	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FU	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FB	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
ECM (Undefined) (IMD)	S	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	R	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	FU	0 (note 1)	0 (note 1)	200/300/100	200/300/100	200/300/100	200/300/100
	FB	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
AGS (H) (IMD)	U	0 (note 1)	0 (note 1)	200/300/100	200/300/100	200/300/100	200/300/100
	B	0 (note 1)	0 (note 1)	200/300/100	200/300/100	200/300/100	200/300/100
AGS (H/R) (IMD)	U	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
	B	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)	0 (note 1)
AGS (L) (IMD)	U	0 (note 1)	0 (note 1)	200/300/100	200/300/100	200/300/100	200/300/100
	B	0 (note 1)	0 (note 1)	200/300/100	200/300/100	200/300/100	200/300/100
ILD		Note 2	Note 2	Note 2	Note 2	Note 2	Note 2
PTR		200/300/100	200/300/100	Note 3	Note 3	Note 3	Note 3
IBD		200/300/100	200/300/100	Note 4	Note 4	Note 4	Note 4

LEGEND

S – Side; R – Rear; F – Front; B – Barricaded; U – Unbarricaded; FU – Front Unbarricaded; FB – Front Barricaded

ECM – Earth-Covered Magazine (7-bar, 3-bar, undefined refers to the strength of the headwall)

AGS – Aboveground Site; aboveground, non earth-covered magazine, structure or storage pad

AGS (H) – Buildings with wall thickness > 17.7 inches of reinforced concrete (27.6 inches brick); as an ES, door is barricaded if it faces a PES

AGS (H/R) – AGS (H) with roof thickness > 5.9 inches of reinforced concrete; as an ES, door is barricaded if it faces a PES

AGS (L) – Light structure, open stack, truck, trailer, or railcar

IMD – Intermagazine Distance; ILD – Intraline Distance;

IBD – Inhabited Building Distance; PTR – Public Traffic Route Distance

NOTES

- (1) Practical considerations will dictate specific separation distances
- (2) ILD = 36% of IBD with a minimum distance equal to the Intermagazine Distance
- (3) PTR = 60% of IBD
- (4) Use Tables 9.6A, 9.6B, and 9.7

GENERAL COMMENTS

- (a) Where three distances are given, the first refers to HD 1.2.1 items with an MCE < 100 pounds, the second to HD 1.2.1 items with an MCE > 100 pounds, and the third refers to HD 1.2.2 items
- (b) All IM distances for HD 1.2.3 items at the ES are 0 (Note 1)

TABLE 9.9. HAZARD SUB-DIVISION 1.2.1, 1.2.2, AND 1.2.3 MIXING RULES

HAZARD SUB-DIVISION INVOLVED	DISTANCES TO BE APPLIED
1.2.1	Apply HD 1.2.1 distances
1.2.2	Apply HD 1.2.2 distances
1.2.3	Apply HD 1.2.3 distances
1.2.1 + 1.2.2	Apply greater of two distances
1.2.1 + 1.2.3	Apply greater of two distances
1.2.2 + 1.2.3	Apply greater of two distances

30420

CHAPTER 3
A.3. (page 3-1)

CURRENT

“ ... This number is placed to the left of the Hazard Division designators 1.1 through 1.3, such as (18)1.1, (08)1.2, and (02)1.3.”

PROPOSED

“ ... This number is placed to the left of the Hazard Division designators 1.1 through 1.3, such as (18)1.1, **(08)1.2.3**, and (02)1.3.”

CHAPTER 3
TABLE 3-6 (and Notes). (page 3-11)
CURRENT

EIDS and EIDS Ammunition	Hazard Classification
EIDS bulk	1.5D
EIDS Loaded projectiles and/or warheads w/o fuzes or with EIDS fuzes ^{1,2}	1.6N
EIDS fuzes ¹	1.4D, 1.4S, 1.6N
EIDS Loaded projectiles and/or warheads w/ 1.3 propelling charges and without fuzes or with EIDS fuzes ^{1,2}	1.2C, 1.3C, 1.4C
EIDS loaded projectiles and/or warheads with non-EIDS fuzes and without 1.3 propelling charges	1.2D ^{3,4} 1.4D ⁴
EIDS loaded projectiles and/or warheads with non-EIDS fuzes ^{2,4} and with 1.3 propelling charges	1.2E ^{3,4} 1.4E ⁴

Notes:

- 1 "EIDS Fuzed" means that the fuze has an EIDS booster with an out-of-line EIDS explosive and two or more independent safety features. The fuze must be certified as invulnerable to accidental detonation of the warhead.
- 2 Fuzed configuration must be tested for propagation. Fuzed Hazard Division 1.6 ammunition must contain either an EIDS fuze or a non-explosive fuze (fuze contains no explosive); otherwise the ammunition is classified as unit risk Hazard Division 1.2.
- 3 Unit risk Hazard Division 1.2 may be justified on a case-by-case basis.
- 4 Fuze must have two or more independent safety features and independently classified Group D.

PROPOSED

EIDS and EIDS Ammunition	Hazard Classification
EIDS bulk	1.5D
EIDS Loaded projectiles and/or warheads w/o fuzes or with EIDS fuzes ^{1,2}	1.6N
EIDS fuzes ¹	1.4D, 1.4S, 1.6N
EIDS Loaded projectiles and/or warheads w/ 1.3 propelling charges and without fuzes or with EIDS fuzes ^{1,2}	1.2.1C, 1.2.2C 1.3C, 1.4C
EIDS loaded projectiles and/or warheads with non-EIDS fuzes and without 1.3 propelling charges	1.2.3D^{3,4} 1.4D ⁴
EIDS loaded projectiles and/or warheads with non-EIDS fuzes ^{2,4} and with 1.3 propelling charges	1.2.1E^{3,4} 1.2.2E^{3,4} 1.4E ⁴

Notes:

- 1 "EIDS Fuzed" means that the fuze has an EIDS booster with an out-of-line EIDS explosive and two or more independent safety features. The fuze must be certified as invulnerable to accidental detonation of the warhead.
- 2 Fuzed configuration must be tested for propagation. Fuzed Hazard Division 1.6 ammunition must contain either an EIDS fuze or a non-explosive fuze (fuze contains no explosive); otherwise the ammunition is classified as unit risk Hazard Division 1.2 (HD 1.2.3).
- 3 Unit risk Hazard Division 1.2 may be justified on a case-by-case basis.
- 4 Fuze must have two or more independent safety features and independently classified Group D.

2-412-2

CHAPTER 8
TABLE 8-2 (page 8-9)

CURRENT

Hazard Division	Unknown Quantity	Known Quantity
Unknown, located in facility, truck, and/or tractor trailer	approximately 3/4 mile (4,000 ft)	4,000 ft
Unknown, located in railcar	approximately 1 mile (5,000 ft)	5,000 ft
1.1 (Explosive A) and 1.5 (See note 1)	Same as unknown facility, truck trailer or rail car as appropriate	
1.2 (Explosive A) and 1.6 (See note 1)	2,500 ft	2,500 ft

PROPOSED

Hazard Division	Unknown Quantity	Known Quantity
Unknown, located in facility, truck, and/or tractor trailer	approximately 3/4 mile (4,000 ft)	4,000 ft
Unknown, located in railcar	approximately 1 mile (5,000 ft)	5,000 ft
1.1 (Explosive A) and 1.5 (See note 1)	Same as unknown facility, truck trailer or rail car as appropriate	
1.2 (1.2.1, 1.2.2, and 1.2.3) (Explosive A) and 1.6 (See note 1)	2,500 ft	2,500 ft

CHAPTER 9
B.1. c.(page 9-1)

CURRENT

“ ... When Hazard Divisions 1.1 and 1.2 are located in the same site, determine the distances for the total quantity considered first as 1.1 and then as 1.2. The required distance is the greater of the two. When the 1.1 requirements are controlling and the HE equivalence of the 1.2 is known (data to support the HE equivalence has been approved by the DDESB) the HE equivalent weight of the 1.2 items may be added to the total explosive weight of 1.1 items to determine the NEW for 1.1 distance determination; otherwise, the total explosive weight of the 1.2 items (including the net propellant weight) is to be added to the total explosive weight of the 1.1 items to determine the NEW for 1.1 distance determination..”

PROPOSED

“ ... When Hazard Divisions 1.1 and 1.2 (1.2.1, 1.2.2, and/or 1.2.3) are located in the same site, determine the distances for the total quantity considered first as 1.1 and then as 1.2. The required distance is the greater of the two. When the 1.1 requirements are controlling and the HE equivalence of the 1.2 (**Net Explosive Weight for Quantity-Distance (NEWQD)** See paragraph C.2.b below) is known (data to support the HE equivalence has been approved by the DDESB) the HE equivalent weight of the 1.2 items may be added to the total explosive weight of 1.1 items to determine the NEW for 1.1 distance determination; otherwise, the total explosive weight of the 1.2 items (including the net propellant weight) is to be added to the total explosive weight of the 1.1 items to determine the NEW for 1.1 distance determination..”

20424

CHAPTER 9
B.1. e.(page 9-2)

CURRENT

“When Hazard Divisions 1.2 and 1.3 are located in the same site, determine the required distance for each separately. The two quantities do not need to be added together for Q-D purposes. The required distance is the greater of the two.”

PROPOSED

“When Hazard Divisions 1.2 (1.2.1, 1.2.2, and/or 1.2.3) and 1.3 are located in the same site, determine the required distance for each separately. The two quantities do not need to be added together for Q-D purposes. The required distance is the greater of the two.”

CHAPTER 9
B.1. f.(page 9-2)

CURRENT

“When Hazard Divisions 1.1, 1.2, and 1.3 are located in the same site, determine the distances for the total quantity considered first as 1.1, next as 1.2, and finally as 1.3. The required distance is the greatest of the three. As permitted by paragraphs B.1.c. and B.1.d., above, HE equivalent weights for 1.2 and 1.3 items may be used in NEW determinations for Q-D purposes; otherwise the rules for adding total explosive (and/or propellant) weight of 1.2 and 1.3 items is to be added to the explosive weight of the 1.1 items (when controlling) to determine the NEW for 1.1 distance requirements.”

PROPOSED

When Hazard Divisions 1.1, 1.2 (1.2.1, 1.2.2, and/or 1.2.3), and 1.3 are located in the same site, determine the distances for the total quantity considered first as 1.1, next as 1.2, and finally as 1.3. The required distance is the greatest of the three. As permitted by paragraphs B.1.c. and B.1.d., above, HE equivalent weights for 1.2 (**NEWQD, see paragraph C.2.b below**) and 1.3 items may be used in NEW determinations for Q-D purposes; otherwise the rules for adding total explosive (and/or propellant) weight of 1.2 and 1.3 items is to be added to the explosive weight of the 1.1 items (when controlling) to determine the NEW for 1.1 distance requirements.

2040

CHAPTER 9
B.1. h.(page 9-2)

CURRENT

“When Hazard Division 1.6 is located with Hazard Division 1.1 or 1.5, Hazard Division 1.6 is considered Hazard Division 1.1 for Q-D purposes. When Hazard Division 1.6 is located with Hazard Division 1.2, Hazard Division 1.6 is considered Hazard Division 1.2 for Q-D purposes.”

PROPOSED

“When Hazard Division 1.6 is located with Hazard Division 1.1 or 1.5, Hazard Division 1.6 is considered Hazard Division 1.1 for Q-D purposes. When Hazard Division 1.6 is located with Hazard Division 1.2 (1.2.1, 1.2.2, and/or 1.2.3), Hazard Division 1.6 is considered Hazard Division 1.2.3 for Q-D purposes and Hazard Sub-Divisions 1.2.1, 1.2.2, and 1.2.3 mixing rules apply (Table 9.9).”

CHAPTER 9
B.1. j.(page 9-2)

CURRENT

“The Q-Ds for Hazard Division 1.1, 1.2, 1.3, 1.5 or 1.6 individually or in combination are not affected by the presence of Hazard Division 1.4.”

PROPOSED

“The Q-Ds for Hazard Division 1.1, 1.2 (1.2.1, 1.2.2, and/or 1.2.3), 1.3, 1.5 or 1.6 individually or in combination are not affected by the presence of Hazard Division 1.4.”

CHAPTER 9
D.1. b.(1) (page 9-27)

CURRENT

(1) Hazard Division (04) 1.2 - gun ammunition, 30 mm or less.

PROPOSED

(1) Hazard Division 1.2.2 - gun ammunition, 30 mm or less.

CHAPTER 9
Key to Table 9-14 (page 9-29)

CURRENT

- 3 For Hazard Division 1.1 explosives, use appropriate intermagazine distance. For Hazard Division 1.2, apply note 10, below.
- 3a For Hazard Division 1.1 explosives, use appropriate intermagazine distance. For Hazard Division 1.2, apply note 10, below. Protects against simultaneous detonation of ammunition on adjacent aircraft, but does not prevent serious damage to aircraft and possible propagation of detonation due to fragments, debris, or fire.

PROPOSED

- 3 For Hazard Division 1.1 explosives, use appropriate intermagazine distance. For Hazard Division 1.2 (1.2.1, 1.2.2, and/or 1.2.3), apply note 10, below.
- 3a For Hazard Division 1.1 explosives, use appropriate intermagazine distance. For Hazard Division 1.2 (1.2.1, 1.2.2, and/or 1.2.3), apply note 10, below. Protects against simultaneous detonation of ammunition on adjacent aircraft, but does not prevent serious damage to aircraft and possible propagation of detonation due to fragments, debris, or fire.

CURRENT

(b) For all types of Hazard Division 1. 1 in quantities of 101 to 30,000 lbs NEW (46 to 13,600 Kg NEQ), the minimum distance shall be 1250 ft (380 m), unless it may be shown that fragments and debris from structural elements of the facility or process equipment shall not present a hazard beyond the distance specified in Table 9-1. For items that have been evaluated adequately, a different minimum distance such as in Table 9-2 may be used. (Facilities sited at 1,235 or 1,245 ft in accordance with past standards shall be considered to be in compliance with the 1,250 ft (380 m) minimum requirement.)

PROPOSED

(b) For all types of Hazard Division 1. 1 in quantities of 101 to 450 lbs NEW (46 to 204 Kg NEQ), the minimum distance shall be given by the relationship:
Minimum Distance = $-1133.9 + 389 \times \ln(\text{NEW})$ [NEW in pounds and Minimum Distance in feet, ln is natural logarithm], with a minimum distance of 670 feet. For NEWs in the range 450 to 30,000 lbs (204 to 13,600 Kg NEQ), the minimum distance shall be 1250 feet. These minimum distances must be applied unless it may be shown that fragments and debris from structural elements of the facility or process equipment shall not present a hazard beyond the distance specified in Table 9-1. For items that have been evaluated adequately, a different minimum distance such as in Table 9-2 may be used. (Facilities sited at 1,235 or 1,245 ft in accordance with past standards shall be considered to be in compliance with the 1,250 ft (380 m) minimum requirement.)

CURRENT

b. Use a risk factor of K40 in the Q-D formula to determine the safe distance for persons not performing ammunition operations. However, if the NEW of burn material is more than 100 pounds, the minimum distance shall be at least 1,250 feet. The minimum safe distance for a NEW of 100 pounds or less shall be at least 670 feet.

PROPOSED

b. Use a risk factor of K40 in the Q-D formula to determine the safe distance for persons not performing ammunition operations. However, if the NEW of burn material is more than 450 pounds, the minimum distance shall be at least 1,250 feet. If the NEW of burn material is 103 to 450 pounds, the following equation shall be used to calculate the minimum distance: Minimum Distance = $-1133.9 + 389 \times \ln(\text{NEW})$ [NEW in pounds and Minimum Distance in feet, ln is natural logarithm]. The minimum safe distance for a NEW of 103 pounds or less shall be at least 670 feet.

CURRENT

3. Bases for Column 5 distances:

1-30,000 lbs - fragments and debris hazard. Lesser distances permitted as follows (see subparagraph E.2.c.(1) of Chapter 2): (a) thin-cased ammunition and bulk explosives with NEW to 100 pounds - 670 feet. (b) Bare explosives in the open, distances computed by formula $d = 40W^{1/3}$. Distances other than 1,250 ft to be used when required by Table 9-2.

PROPOSED

3. Bases for Column 5 distances:

1-30,000 lbs - fragments and debris hazard. Lesser distances permitted as follows (see subparagraph E.2.c.(1) of Chapter 2): (a) thin-cased ammunition and bulk explosives with NEW to 100 pounds - 670 feet. If the NEW is 101 to 450 pounds, the following equation shall be used to calculate the minimum distance: Minimum Distance = $-1133.9 + 389 \times \ln(\text{NEW})$ with a minimum distance of 670 ft (NEW in pounds and minimum Distance in feet, ln is natural logarithm), (b) Bare explosives in the open, distances computed by formula $d = 40W^{1/3}$. Distances other than 1,250 ft to be used when required by Table 9-2.

ATTACHMENT B

DOD EXPLOSIVES SAFETY BOARD RISK-BASED EXPLOSIVES SAFETY CRITERIA WORKING GROUP CHARTER

GENERAL

The DDESB Risk Based Criteria Working Group is established by the Chairman, Department of Defense Explosives Safety Board, and will report to that Board through the U. S. Air Force member.

The Working Group Chair is authorized to establish sub-groups and assign tasks to carry out Working Group projects.

Working Group members are responsible for representing their Services on all matters addressed by the Working Group and for proposing initiatives and issues for Working Group consideration.

OBJECTIVES

The objectives of this Working Group are:

Phase II:

Implement the Plan of Action and Milestones (POA&M) as defined during Phase I.

Develop a risk-based model for explosives safety management. The principles supporting SEI level 2 software will be used in this development.

Develop a draft DDESB technical paper documenting the process for risk-based explosives safety management

Recommend risk-based explosives safety criteria.

Finalize a complete set of P(f/e) curves.

Conduct surveys at various sites using the risk-based approach.

Implement risk-based approach at Service headquarters.

Develop a briefing entitled "New Approach to Explosives Safety" for presentation at the Service level.

Develop training materials for training field personnel.

Implement the risk-based approach at the field locations.

The risk-based model will be put on the DDESB homepage for access at remote locations.

ACTIONS TO BE ACCOMPLISHED

Specific tasks to be performed in accomplishing the objectives of this Working Group include, but are not limited to:

Phase II:

Implement the approach defined in the POA&M established in Phase I of the study,

Develop the risk-based model defined in Phase I of the study,

Prepare draft DDESB Technical Paper #14 (outline was drafted in Phase I),

Finalize the probability of fatality curves,

Conduct risk surveys using risk-based approach, and

Implement the risk-based approach at the Service headquarters.

Present a briefing to the services which describes the risk-based approach,

Develop training materials on the risk-based approach,

Implement the risk-based approach at the field locations, and

Put the risk-based model on the DDESB homepage.

REQUIREMENTS

Decision-Making. Working Group Members are responsible for representing their Service, proposing issues that affect their Service, and developing issues/proposals and other requirements as agreed on by Working Group. Decisions of the Working Group will be based solely on a consensus of the group; however, all dissenting Service positions will be presented in the final Working Group position. A voting structure has been deemed as unnecessary.

Membership. The following representatives have been designated as members of the DDESB Risk-Based Explosives Safety Criteria Working Group:

1.	DDESB Lead	Dr. Jerry Ward	DDESB Secretariat
2.	DDESB	Mr. Charles Cates	DDESB Secretariat
3.	DDESB	Capt K.C. O'Heran	DDESB Secretariat
4.	USMC Lead	CW02 Robert Taylor	MARCORSYSCOM
5.	USN Lead	Mr. Eric Alchowiak	OPNAV (N411)
6.	USN	Mr. Tony Dunay	Naval Ordnance Center, N71
7.	USA Lead	Mr. Pete Yutmeyer	U.S. Army Technical Center
8.	USA	Mr. Jim Patton	HQDA/ASO
9.	USAF Chairman	Mr. Paul Price	Air Force Safety Center
10.	USAF	Ms. Denise Fattor	Air Force Safety Center

Working Group Chair. The U.S. Air Force will provide a Chairman for the Working Group. The Chairman will, at a minimum:

Act as the focal point for all matters related to the Working Group.

Ensure that pertinent information is disseminated to Working Group members, e.g., minutes, reference material and, technical papers.

Coordinate and lead Working Group meetings.

Prepare and manage a working group budget. Assign funding for support as needed.

Provide status reports to the Board.

Provide a Working group recommendation to the Board.

Group Secretariat. APT Research, Inc. will continue the work began in Phase I and serve as the technical coordinator. In this capacity they will provide direct technical support to the chairman and members by coordinating and integrating the technical activities of the group. The group secretariat will also publish reports, papers, and presentations as required.

Meetings. The Working Group will meet at the call of the Chairman.

Invited Participants. Working Group members are encouraged to invite and utilize subject matter experts in the formulation of their Service position and in their working Group participation.

OPERATIONS AND ADMINISTRATION

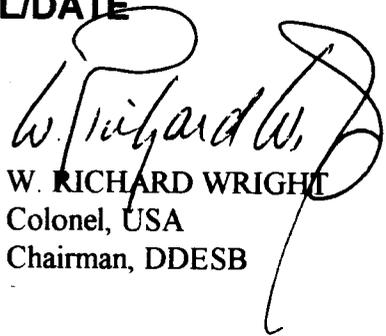
A copy of all pertinent correspondence will be provided to Chairman, DDESB and each Board Member.

Technical, administrative, and other functional support will be provided from within each of the Service organizations.

Services are responsible for travel and other funding requirements of their member associated with Working Group activities.

The DDESB Risk-Based Criteria Working Group for Phase II is hereby chartered for two years from the date of approval of this charter with the provision that the Chairman, DDESB may extend the term if he desires. At the end of one year the Chairman, DDESB is to review the charter to determine the need for any further continuation of the Working Group. If at any time a determination is made that the Working Group efforts have been completed, the Chairman, DDESB, will take action to disestablish the working group.

CHARTER APPROVAL/DATE


W. RICHARD WRIGHT
Colonel, USA
Chairman, DDESB

8/18/98