Explosives Regulatory Division
Directive Letter # 60
July 2007

Amendments to the Quantity Distance Principles Manual

This Directive Letter is the first amendment to the Quantity Distance (Q/D) Principles Manual.

1. Errata

The following are the errata for the Manual. Some may already have been corrected in later printings.

1. p. 3-3 In the table, change “space” to “sparse.”
2. p. 3-3 In the * note under the table, change “seson” to “season.”
3. p. 5-1 In Section 5.1, Column D7, change Q1/2 to $Q^{1/2}$.
4. p. 5-3 In Section 5.7, in the third paragraph, change “explosies” to “explosives.”
5. p. 8-3 In Table 3, reverse the icons for single and double cars in lines 8 and 9.
6. p. F-4 In paragraph 15 d), change “the show” to “to show.”
7. p. F-4 In paragraph 16 a), remove the word “dashed” in two places.

2. Potential Effect

Explosives are in Class 1 under the UN system of classifying dangerous goods. Class 1, in turn, is divided into 6 Hazard Divisions (1.1, 1.2, etc.). Hazard Divisions (HD) work well for transportation, but they do not always work well for manufacture or storage. Therefore, for manufacture and storage, the concept of Potential Effect (PE) is being introduced. For details, refer to Directive Letter # 59. Therefore, the QD Manual is hereby amended as follows:

Reference to HD 1.1 and/or 1.5 shall mean PE 1.
Reference to HD 1.2 shall mean PE 2.
Reference to HD 1.3 shall mean PE 3.
Reference to HD 1.4 (other than CG S) shall mean PE 4.

There is no need to actually make physical changes in the Manual – just remember the concept.

Explosives classified as 1.4S where the classification is based on the article, not including the packaging, generally will not require QD. However, large quantities will still need some separation, mainly from people. For example, see item no. 13 below with respect to safety cartridges (also known as small arms ammunition). Further guidance will be given through future Directive Letters.

3. Options to Full Quantity Distance

Abiding by the QD tables is the primary method for siting facilities. Risk methods may be used on a case-by-case basis as approved by an inspector. The following are some of the methods or programs that may be considered:

- Hazard Debris Analysis (HDA)
- Quantified Risk Assessment (QRA)
- Hazard and Operability Review (HAZOP)
- IMESAFR

4. Acceptable Methods of Measuring Distance

In addition to measuring tape, the following are acceptable methods of measuring distances:

- range finder (laser)
- GPS
- Google Earth
- survey map

The method of measurement should be stated.

5. Traffic Definitions

The definitions for traffic density in the table on page 3-3 need further explanation.

- Medium traffic is between 500 and 5000 vehicles per day.
- Light traffic is between 20 and 500 vehicles per day.
- Private roads such as a mine road with less than 20 vehicles per day may be ignored with the approval of an inspector.

6. Vulnerable Construction

In the PE 1 table, Column D8 is for vulnerable construction. The Manual, in Section 3.5, describes three types of construction that are considered vulnerable.

The concept of "vulnerable construction" has been expanded to include all Group 6 buildings (see Appendix C of the Manual).

7. PE 1 Between 270 m and 400 m

The normal minimum distance is 400 m. This provides debris protection from the explosion. A minimum distance of 270 m may be used if there are 20 or fewer people between 270 m and 400 m. This is a basic form of risk management.

8. QD for Airports

When siting magazines in proximity to airports and airfields, the guidance in Section 6.4 of the Manual continues, i.e., contact an inspector for guidance. Generally, D7 distance will be required for a passenger terminal in a remote site; otherwise, D8 will apply.

9. Distance Between Bullet-Resistant and Non-Bullet-Resistant Magazines

It does not make sense to require some magazines to have bullet resistance (BR) and then permit a non-bullet-resistant magazine, such as a Type 6, to be located next to a BR magazine. Therefore, a non-BR magazine (donor) will need to be separated from a BR magazine (acceptor) by D2 distance if there is a barricade between the two and by D6 distance if not barricaded.

10. Grandfathered Licences

Some licences were grandfathered for QD when the Manual came into force. It is incumbent upon the applicant to make sure that nothing has changed, such as encroachment, that would affect QD. Grandfathered licences will not be permitted to move and then come back to the original location (zone licence) if there was not full QD at the original location. Grandfathering also means that quantities and the number of storage locations (magazines or storage units) on the licence cannot be increased.

11. 1.1G

Large-calibre fireworks shells and sound shells have been reclassified 1.1G for transportation and, hence, are considered as PE 1. Less than 100 kg gross weight may not require full PE 1 distance. Some conditions, such as requiring at least 50% free space in the magazine, will apply. Consult an inspector for guidance.

Magazines for PE 1 fireworks are not required to be bullet resistant.

12. NEQ and NEEQ for Fireworks

Consult Directive Letter # 59 for guidance on Net Explosive Quantity and Net Explosive Equivalent Quantity and how it applies to QD.

13. Storage of Safety Cartridges in a Multi-Tenant Building

Explosives classified 1.4S for transport generally do not have an assigned PE. Storage implies adequate access for fire fighters and firefighting equipment.

The limit for safety cartridges above which a licence is required is 225 kg NEQ. Such a large quantity could pose problems if the storage is in a multi-tenant building, for example, a strip mall or office building.

The magazine construction requirements in such a building include: concrete block walls, a concrete floor and a concrete ceiling. The magazine should be equipped with sprinklers and must have a ventilation system separate from the rest of the building.

Alternatively (to the previous paragraph), the Explosives Regulatory Division (ERD) will accept that a fire plan prepared in accordance with the National Fire Code has been approved by the local authority having jurisdiction.

14. Metric Version of Section 5.10 Bulk Ammonium Nitrate

The table on page 5-9 (reproduced from NFPA 495) has been converted to metric. This amendment is to replace the existing Section 5.10 with the following:

> Whenever bulk ammonium nitrate (AN) is located near blasting explosives (PE 1) storage, the National Fire Protection Association (NFPA) 495 Explosive Materials Code shall be used to determine whether or not the AN is situated far enough from a donor site to be ignored for QD purposes. If it is not far enough away, then one half of the weight of the AN must be considered as explosive for QD calculations.
>
> Table 9.4.2.2(a) from NFPA 495 is used (reproduced on the last page). This table is in metric units.
>
> This table is used to determine if a bulk AN storage site such as a silo is located at a sufficient distance from a donor site, such as a blasting explosives magazine, to be ignored in the QD calculations for the magazine.
>
> An example should help to illustrate the use of the table.
>
> A 30 000-kg bulk AN silo is near a 20 000-kg blasting explosives magazine. How far away from the magazine must the silo be to be ignored in the QD calculations for the magazine?
>
> The donor is 20 000 kg. Choose the 18 000-20 000 kg line in the following table. From the Minimum Separation Distance column, read 6.6 m. This distance applies if there is a minimum 87-cm barricade between the silo and the magazine.
>
> If there is no barricade or an inadequate barricade, the minimum distance must be 6.6 m x 6 = 39.6 m (see Note 2).
>
> Therefore, if the distances are greater than those calculated above, the AN may be ignored for the QD calculation for the magazine. If the actual distances are less than those calculated, then the AN (half the weight) must be taken into consideration. In the example, the NEQ would be:
>
> 20 000 kg (magazine) + ½ x 30 000 (silo) = 35 000 kg

Notes:

1. These are minimum separation distances to prevent the sympathetic explosion of bulk ammonium nitrate (acceptor) in the case of an explosion in a nearby blasting explosives magazine (donor).

2. When there is no barricade between the donor and acceptor, the distances must be multiplied by a factor of six.

3. Earth, sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand are acceptable artificial barricades. Natural barricades may also be acceptable (see Appendix E).

Chris Watson, Ph.D.

Chief Inspector of Explosives

Att. (1)

Table of Recommended Separation Distances of Ammonium Nitrate from Blasting Explosives			
Donor Weight		**Minimum Separation Distance of AN When Barricaded (m)**	**Minimum Thickness of Artificial Barricades (cm)**
Kilograms Over	**Kilograms Not Over**		
0	50	0.9	31
50	135	1.2	31
135	275	1.5	31
275	450	1.8	31
450	725	2.1	31
725	900	2.4	31
900	1 400	2.7	38
1 400	1 800	3.0	38
1 800	2 800	3.4	39
2 800	3 600	3.7	50
3 600	4 500	4.0	51
4 500	5 500	4.3	51
5 500	7 250	4.6	63
7 250	9 000	4.9	64
9 000	11 500	5.5	65
11 500	13 500	5.8	76
13 500	16 000	6.1	76
16 000	18 000	6.4	76
18 000	20 000	6.6	87
20 000	23 000	7.0	89
23 000	25 000	7.3	89
25 000	28 000	7.6	89
28 000	32 000	7.9	102
32 000	36 000	8.5	102
36 000	40 000	9.0	102
40 000	45 000	9.7	102
45 000	54 000	10.4	126
54 000	64 000	11.3	127
64 000	73 000	12.3	127
73 000	82 000	13.4	127
82 000	91 000	14.6	128
91 000	100 000	15.8	152
100 000	113 000	17.1	152
113 000	125 000	18.3	152
125 000	136 000	19.5	152