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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Forty-sixth session**

Geneva, 1 – 9 December 2014

Item 2 (a) of the provisional agenda

**Recommendations made by the Sub-Committee on its forty-third, forty-fourth  
and forty-fifth sessions and pending issues: explosives and related matters****Classification of fireworks****Transmitted by the expert from the Netherlands<sup>1</sup>****Introduction**

1. At the forty-fifth session the Netherlands proposal ST/SG/AC.10/C.3/2014/59 was discussed in conjunction with informal document INF.5. The proposal dealt with the classification of waterfalls, a particular type of fountains, for which it is demonstrated that the results of Test Series 6 do not predict the hazards on a larger scale.

In Tests 6(a) and 6(b) no mass explosion was found, in Test 6(c) thermal effects were dominant resulting in a 1.3G classification. Full-scale trials in a 20 foot container resulted in a mass explosion. Informal document INF.5 gave a summary of a research programme aimed at finding a cause for this behaviour.

2. In document ST/SG/AC.10/C.3/2014/59 it was proposed to address the classification of fountains by subjecting the pyrotechnic composition to the HSL flash composition test described in Appendix 7 of the Manual of Tests and Criteria with consequential amendments to paragraph 2.1.3.5.1 of the Model Regulations, to Note 2 in paragraph 2.1.3.5.5 and to the default table.

3. In the working group on explosives there was support to address the classification of waterfalls but there was concern that by addressing the whole range of fountains unintended consequences could result and extensive testing would need to be done. The Working group

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<sup>1</sup> In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

concluded that a revised proposal “should not affect a broad range of products.” (see informal document INF.61; paragraph 4.)

## Approach

4. Several options to limit the scope of the proposal were considered: inserting limits on the density of the pyrotechnic composition in the article, on the shipping density (mass of pyrotechnic composition per unit volume cargo transport unit) and on the particle size of the spark producing metal. Whilst all these parameters are important for the behaviour of the waterfalls, any proposed limit is more or less arbitrary and not supported by experimental data.

5. The Netherlands believes that the best way forward is to limit the proposals to waterfalls. To identify these products a definition needs to be given. To assess the mass explosion potential the pyrotechnic composition of waterfalls shall be subjected to the HSL Flash composition test (or the US Flash composition test, when adopted). When a positive result in the flash composition test is obtained the waterfall should be classified as 1.1G. Given the fact that Test Series 6 does not predict the actual hazards of waterfalls, the option of “lowering” the default classification by performing Test Series 6 should not be given to the default 1.1G waterfalls.

When a negative result is obtained in the flash composition test, the default classification shall be 1.3G with the option of obtaining a 1.4G classification by performing Series 6 tests.

## Proposal

6. On this basis it is proposed to amend:
  - (a) Paragraph 2.1.3.5.1 to make clear that if a 1.1G default classification is obtained this result takes precedence over Test Series 6 results;
  - (b) The default table by inserting a row for “Waterfall”, just below the row for “Fountain”; and
  - (c) Section 4 of Appendix 7 of the Manual of Tests and Criteria to introduce the words “positive result” as used in this proposal.
7. Amendments are indicated in ***bold italics***, deletions are indicated by ~~strike through~~.
  - (a) Under the heading of “2.1.3.5 Assignment of fireworks to hazard divisions”  
Amend 2.1.3.5.1 to read:  
“Fireworks shall normally be assigned to hazard divisions 1.1, 1.2, 1.3 and 1.4 on the basis of test data derived from Test Series 6. However:
    - (a) ***Waterfalls giving a positive result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria shall be classified as 1.1G regardless of the results of Test Series 6.***
    - (b) Since the range of such articles... (present text).”
  - (b) In the row of fountain delete in the second column (Includes/Synonym) “showers”.

Add in the column “definition” a note reading: ***Note: fountains intended to produce a vertical cascade or curtain of sparks are considered to be waterfalls (see row below)***

As a result the row of fountain will read:

Type	Includes: / Synonym:	Definition	Specification	Classification
Fountain	Volcano, gerbs, <del>showers</del> , lances, Bengal fire, flitter sparkle, cylindrical fountains, cone fountains, illuminating torch	Non-metallic case containing pressed or consolidated sparks and flame producing pyrotechnic substance  <i>Note: fountains intended to produce a vertical cascade or curtain of sparks are considered to be waterfalls (see row below)</i>	$\geq 1$ kg pyrotechnic substance	1.3G
			$\leq 1$ kg pyrotechnic substance	1.4G

(c) Insert a row for “Waterfall” in the default table below the row for “Fountain” reading:

Type	Includes: / Synonym:	Definition	Specification	Classification
<i>Waterfall</i>	<i>cascades, showers</i>	<i>pyrotechnic fountain intended to produce a vertical cascade or curtain of sparks</i>	<i>containing a pyrotechnic substance which gives a positive result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria regardless of the results of Test Series 6 (see 2.1.3.5.1 (a))</i>	<i>1.1G</i>
			<i>containing a pyrotechnic substance which gives a negative result when tested in the HSL Flash composition test in Appendix 7 of the Manual of Tests and Criteria</i>	<i>1.3G</i>

(d) Consequential amendment: In Appendix 7 of the Manual of Tests and Criteria, section 4, second sentence change to read: “The **result is considered positive “+” and the** pyrotechnic substances in powder form or as pyrotechnic units as presented in the fireworks, that are used to produce an aural effect, or used as a bursting charge or lifting charge, is to be considered as flash composition if the minimum time taken for the pressure rise is shown to be less than, or equal to, 6 ms for 0.5 g of pyrotechnic substance.”

## Remarks

(a) In paragraph (d) above reference is made to 6 ms as the criterion for flash composition. At the 42<sup>nd</sup> session the 6 ms was adopted. However the figure 8 ms still appears in Appendix 7 and should be corrected to 6 ms.

(b) When the US Flash composition test is accepted as an alternative test for the HSL Flash composition test, the wording in 2.1.3.5.1 (a) and the default table should be slightly changed to "... when tested in *one of* the ~~HSL~~ Flash composition tests in Appendix 7 of the ..." (three occurrences).

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