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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**
(Twenty-first session, 1-10 July 2002,
agenda item 3(a))

**Comments on the Report of the Working Group on the Classification of Fireworks,
16-18 October 2001 (The Hague, Netherlands)**

Transmitted by the expert of the United States of America

The expert from the United States of America has reviewed the report of the UN working group on the classification of fireworks, ST/SG/AC.10/C.3/2002/1 and offers the following comments for considerations by the Sub-Committee at the July 1 - 10, 2002 meeting:

General Comments:

1. The default system for the classification of fireworks should cover Divisions 1.1G, 1.3G, 1.4G and 1.4S. We do not believe that a Div. 1.2G category is necessary because of the nature of the design and construction of fireworks (i.e., fireworks are intended for consumers and display purposes). We believe that certain small items (or novelties) can be assigned to Div. 1.4S with clear definitions or descriptions. We do not support the view that certain novelty Division 1.4S fireworks can not be classified on the basis of a default system because the packaging may change its classification. We agree that a firework item not listed in the default list as a Division 1.4S classification should be assigned based on tests in accordance with relevant classification procedures for Class 1 items. Furthermore, it is necessary to include fireworks containing a very small quantity of "report composition" in Div. 1.4G because currently those products exist in many countries with an excellent safety record.
2. We do not support the view that criteria for differentiation between 1.1G, 1.3G and 1.4G are solely based on the dimensions of firework items. We wish to again emphasize our position that it is the weight of chemical composition, and the type of composition that primarily determine the outcome to be expected when a test series 6 test is performed on fireworks devices as packaged for transportation. These two factors, "weight of chemical composition" and "type of composition", determine the degree of hazards of different fireworks. A default system based solely on outside dimension of a firework item does not provide sufficient information on which to base classification and such a system should not be incorporated into the transport regulations.

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3. We recommend: (1) specific chemical composition weight limits, not dimensions be assigned to each firework category in the default table, and (2) that a section be added to the default system to emphasize that only pyrotechnic compositions (chemical mixtures of oxidizers and fuels) are permitted in fireworks. No other explosive substances, as defined and listed in the UN table, are to be used in fireworks with the exception of black powder (or other specifically identified explosive substances).

Specific Proposals:

I. For 2.1.3.5 Assignment of fireworks to Hazard Divisions:

1. Add UN 0337 to 2.1.3.5.2.
2. Add a new sentence in 2.1.3.5.3 before the last sentence to read: "Assignment by such a default system applies only to fireworks that contain no Class 1 explosive substances, as defined and listed in the UN Dangerous Goods List with the exception of black powder or other specifically identified explosive substances."

II. For firework categories:

As stated in our earlier papers on this topic, the United States of America has had default fireworks classification system in place for over 50 years. This system classed larger fireworks, mostly intended for licensed public display, in Div. 1.3G while classed smaller fireworks, mostly used by consumers, in Div. 1.4G. The validity of this system has been tested by a series of intentional and unintentional tests, some of them are large scale tests.

In 1983 two 6.1 meter (20 foot) steel shipping containers each filled with 6,800 kilograms (15,000 pounds) of assorted 1.4G fireworks (classified according to the U.S. default system) packaged in conditions required for transport were tested. A substantial wood fire was ignited under the container in Test 1 and alongside the container in Test 2. In both tests, a fire resulted that lasted well over one hour. There was no mass explosion, no bursting or rupturing of the container, and no mass fireball. The fireworks used for the tests included aerial fireworks and fireworks with 0.13 gram reports, as well as braided strings of firecrackers with 0.05 gram reports.

In addition, there have been occasional fires in the United States of America where stored consumer fireworks (1.4G) have become involved (although none of these fires were initiated by the fireworks). In all of these instances, similar results were observed; the fires lasted for extended periods of time, but no explosions or mass fireballs occurred. The fire experience in the United States of America with fireworks classed as Division 1.3G, primarily aerial shells, according to the U.S. default system has been substantially different from incidents that have been discussed by the working group. In these instances, the fire has been much shorter in duration, and most of the events would be deemed an "explosion" by persons observing the event.

Based on these experiences we propose to set weight limits based on the chemical composition, not based on outside dimension of the firework, as classification criteria for firework categories in the Working Group's Default table. Our proposal assumes that any components in a firework that produces a "report" are limited to 0.13 grams of pyrotechnic composition per report. Multiple reports are permitted in a device, provided all reports are separately fused.

1. Shell, spherical or cylindrical

We have not had the opportunity to see or review the test data that support a classification of 1.1G for all color shells ≥ 200 mm. We also have not seen data to support a 1.1G classification for report shells that contain 70 grams or less of explosive composition; tests conducted in the U.S. in the past have indicated that these products behave in a manner warranting 1.3G classification. We recommend that a 1.4G default classification be added to this category for aerial shells containing 60 grams or less of pyrotechnic composition, when the shells are preloaded into mortar tubes, or when they are packed in a retail sales kit (with a mortar tube included) that contains a maximum of 12 shells, with total pyrotechnic composition not exceeding 400 grams, and with any report component limited to 0.13 grams of composition per report. Tests have been conducted on these products in the U.S., and they do not produce a mass explosion or mass fireball.

2. Roman candles

We recommend 20 grams as the dividing line between 1.4G and 1.3G. For report components, we recommend a limit of 0.13 grams for 1.4G classification. Test data should be obtained to determine the proper dividing line between 1.3G and 1.1G for roman candles with flash composition exceeding 0.13 grams.

3. Rockets

We recommend that 20 grams be used as the dividing point between 1.4G and 1.3G, and that 0.13 grams of report be the dividing line between 1.4G and 1.3G for rockets with a report effect. Test data should be obtained to determine where the dividing line between 1.3G and 1.1G should be drawn.

4. Mines

Pot-a-feu. We recommend that a total weight of pyrotechnic composition of 60 grams be the maximum for a 1.4G device; if any report effect is present, the 1.4G versus 1.3G classification should be based on a maximum weight of report composition, per report, of 0.13 grams.

Bag Mine. This category of device should not be included in the 1.4G category unless it is packaged with a mortar tube. For 1.4G classification, we recommend that these devices be limited to retail sales kits containing a maximum of 12 articles (each article is limited to a maximum of 60 grams of pyrotechnic composition and a total weight of pyrotechnic composition of 400 grams per kit), with a mortar tube included in the package. Any report component should be limited to 0.13 grams for 1.4G classification.

5. Fountain.

We recommend that the default 1.4G limit be established at 75 grams of pyrotechnic composition for a cylindrical fountain or torch, and 50 grams for a cone fountain.

6. Sparkler

We feel that the proposed limit of 10 grams is way too low for the dividing line between 1.4G and 1.3G behavior, particularly for sparklers that do not contain a chlorate or perchlorate oxidizer. We recommend that a 1.4G default limit of 100 grams be established for sparklers that do not contain either of these oxidizers.

7. Low Hazard Fireworks/Novelties

Limits should be established for these devices, by category or type of device. Many of these devices use explosives like silver fulminate or potassium chlorate/red phosphorus mixture, and low limits are needed for 1.4G classification. We recommend a limit of 0.001 gram for silver fulminate, and 0.016 grams for potassium chlorate/red phosphorus mixtures. The use of any other explosive listed in the UN table should be prohibited in these items.

8. Spinners

We support the proposed 20 grams division between 1.4G and 1.3G. We recommend that a limit on report composition be established for these devices as well, and we suggest that the limit be set at 0.050 grams for any report effect produced at a height of less than 5 meters, and 0.13 grams for report effects produced at a height greater than 5 meters in the air.

9. Wheels and Aerial Wheels

We support the proposed limits. We also recommend that a limit of 0.050 grams should be established for any report effect in a wheel for 1.4G classification, with this limit raised to 0.13 grams for report effects produced at a height of 5 meters or greater.
