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 **26 September 2012**

Forty-second session
Geneva, 3 – 11 December 2012
Item 2 (d) of the provisional agenda
Recommendations made by the Sub-Committee on its thirty-ninth, fortieth and forty-first sessions and pending issues: miscellaneous proposals for amendments to the Model Regulations on the Transport of Dangerous Goods

Lamps containing small quantities of dangerous goods

Transmitted by the Global Lighting Association (GLA)

Annex

GLA Responses to the questions raised by the Sub-Committee

Question 1: Is it more appropriate to have Special provisions assigned against individual UN No. (as per the United Kingdom's proposal), or should the Special provision be assigned against UN3363?

GLA response: One special provision for UN3363 may be easier to implement and to understand for users of dangerous goods regulations rather than to implement many equal special provisions for several UN numbers. These special provisions should not be mentioned on the shipping documents (e.g. an airway bill) as they can lead to denials of shipments. As proposed by the US representative, insertion of appropriate text in e.g. 1.1.1.9 is also physically justified and is very similar to the decision on exemption for lamps from division 2.2. Gasses (see, 3.2.2.4.d)).

Question 2: Is it true that smaller lamps will break more easily and therefore require a shorter drop test height?

GLA response: The packaging of lamps - independent from the size of lamps – according to quality management of lamp manufacturers, has to stand a drop test of at least 0.8 to 1.0 meter to assure transport without breakage of the lamps up to end-user. The manufacturers use different packages with proper cushioning material inside and proper material for the outer box to prevent such breakage. In general, lamp manufacturers use some variant of these drop tests derived from a set of ISO norms covering drop-tests on packagings, vibrations, stacking on a pallet and drop tests of a whole pallet.

Question 3: Used lamps are no-longer dangerous as their chemical composition has changed once used?

GLA response: The tiny amounts of dangerous goods present are taking part in chemical reactions during lamp operation. Many of them will be bonded in a different form over the lifetime of the lamp, some will remain as they are or some residues remain to ensure a proper lifetime and light output performance of the lamp. Some of the substances are bonding oxygen and water when that is released by lamp parts over life. Most of the substances will be stuck to the inner lamp parts and will be difficult to release in case of lamp breakage.

The GLA supports the proposal to take out the word 'waste' in reference to the remark of the USA/Canada during the forty-first session of the Sub-Committee; substitute it with an alternative word e.g. "used lamps".

Question 4: How do we deal with lamps which contain UN2911 Class 7 combined with other dangerous goods? IAEA may have made the UN2911 Class 7 element subject to competent authority approval but they will not consider the other classes of dangerous goods that a lamp contains.

GLA response: Lamps may contain tiny amounts of other dangerous goods but these do not have an interaction with the applied nuclides in the lamps (Krypton-85 and thorium). Krypton is a noble gas and thorium is applied in electrodes (1-2 weight percent only) and is locked into the Tungsten matrix. As confirmed by IAEA and UK-HPA, lamps with mentioned nuclides are safe, even in accident scenarios.

In a recent investigation on lamps containing thoriated electrodes (Th-232) executed by the competent authority of Switzerland at a recycling plant, they couldn't detect any radiation

variation against the background radiation. This confirmed that even radiation at massive lamp breakage does not lead to an unacceptable exposure.

Question 5: Exact composition of dangerous goods within a lamp is desirable. The more precise information the Sub-Committee have the easier it will be for appropriate regulations to be developed.

GLA response:

Following some examples of solid compounds with quantities as usual in one lamp. Mercury and traces of radioactive material are not mentioned because already especially considered for lamps (cmp. UN3506 for mercury in lamps, and current final draft of IAEA Transport Specification). Also pressure values of compressed gas (class 2.2) in lamps are not mentioned because if exceeding 100 hPa, it is not subject to this regulation acc Ch. 2.2.2.3 and 2.2.2.4. It should be mentioned here that many lamp types do not contain any DG but which are not meeting the same market requirements than other lamp types as considered here.

Different compounds may be identified with the same UN number. The exact formula depends on lamp type (with defined values for electricity, energy-efficiency, light colour, life time etc.) and on technology used by the manufacturer (size and material of the glass bulb, of electrodes etc.).

Example for dangerous goods with quantities as contained in one lamp:

(The tolerance for quantity values is very low, the min-max range below considers many lamp types with different formulas but containing the same substances as listed)

- Thallium Iodide (0mg in some lamps) 0.5-3 mg
- Rare earths (0mg in some lamps) 1 mg- 5 mg
- Mercury Iodide (always present due to reactions) 3-30mg
- Mercury Bromide (absent in almost all lamps) 0.5-5 mg
- Rest metal halides, less dangerous(NaI,InI,MnI2,CaI2) <30mg

Question 6: Clarification "What is a lamp"?

GLA response: ELC

Clarification for the wording:

- "Lamp" is a light source using electrical equipment or using direct electrical supply for operation.
- Luminaire: Device in which a light source is fitted.
- "Bulb" is commonly considered in the English language as an incandescent lamp, so does not cover all lamp types e.g. discharge lamps.

Short explanation of the term "lamp":

A source that emits radiation (UV, visible light or Infrared) and is powered by electricity via a lamp socket or connector wires. A lamp is placed normally in a luminaire to direct or diffuse the radiation.

Proposed wording for definition of the term "Lamp":

Manufactured article which as light source, creates light during defined operation conditions by using electricity but not containing the source of electricity. A lamp may be an integral component of an application (e.g. luminaire) necessary as source of electricity for lamp operation. There are other means of illumination as e. g. petroleum lamps, articles

using fluorescence or phosphorescence creating light without electrical supply and therefore not meeting the definition of the term “lamp”. For clarification, the term “bulb” is one outer glass component of most lamp types (some may consist of 2 or 3 “bulbs”) encapsulating the process of light creation. The meaning of the term “bulb” depends on local understanding and/or individual knowledge, sometimes it only means “incandescent lamps” excluding e.g. discharge lamps.

Question 7: Are there any lamps which contain only one Class of dangerous goods or are they all likely to contain a mixture?

GLA response: For clarification, a short review per lamp technology to be considered for this discussion:

(a) In almost all discharge lamps, mercury is used.

(b) Low voltage discharge lamps as fluorescent lamps (including the so called “energy saver lamps”) contain mercury, in general 5mg or less is used per lamp. No other dangerous goods are contained within that type of low voltage discharge lamps.

(c) High Intensity Discharge lamps (HID) normally contain more chemical metals/substances to make the principle (plasma arc between the electrode tips) work. Rare Earth metals are used to make the optimal combination to emit the desired type of radiation/light. Part of the metals will be in gas-stage with each other in the arc during lamp operation; when the lamp is cold they will stick to the glass wall.

(d) Certain types of HID also need a tiny amount of nuclides (Kr-85 or Th) to get a good lamp performance.

(e) Some lamps types also have a high pressure (class 2.2) even in a cold stage, but this is done with a noble gas that has no further interactions with the other materials.