UN/SCETDG/17/INF.10

Sub-Committee of Experts on the Transport of Dangerous Goods (Seventeenth Session, Geneva, 6-15 December 1999, agenda Item 2 (a) and 2(b))

DEVELOPMENT OF PROVISIONS FOR THE TRANSPORT OF GASES

UK Comments on Proposals contained in UN Document ST/SG/AC.10/C3/32/Add.1 presented at the 16th Session of UN Sub-Committee of Experts, 5-14 July 1999.

Transmitted by the Expert from the United Kingdom

Background

1. The Working Group on Transportable Gas Receptacles met from 5 to 8 July 1999 during the Sixteenth Session of the Sub-Committee of Experts. The report of the Working Group is contained in document ST/SG/AC.10/C3/32/Add.1.

2. The United Kingdom wishes to submit this Information Paper commenting on the report contained in ST/SG/AC.10/C3/32/Add.1. This paper is requested to be considered at the Seventeenth session of the UN Sub-Committee of Experts within the Gases Working Group of that Sub-Committee, to be held between 6 to 9 December 1999.

3. This INF Paper comments on the above Working Group Report, provides information and offers further proposed text where appropriate. Minor editorial amendments will be raised by the UK during discussion at the Gases Working Group meeting.

Discussion

Proposal 2: Definitions and General Provisions in Part 2.

4. **Regarding Paragraph 6.**

The above document ST/SG/AC.10/C3/32/Add.1. proposes to introduce the term *"highly toxic gases"* into the UN Model Regulations as opposed to using the established phrase *"gases with an LC_{50} lower than or equal to 200ppm"*. Use of the term *'highly toxic'* is potentially confusing as it consequently introduces the concept that certain gases are 'less' toxic and therefore specific definitions would be required to distinguish between these terms. The term *'highly toxic'* does not offer a criterion to judge what is toxic without further clarification. This has the potential to confuse the user, consignor or consignee leading to potentially dangerous classification of dangerous goods. The UK therefore opposes this proposal and suggests that the term *"gases with an LC_{50} of lower than or equal to 200ppm"* is retained. This terminology defines what is considered toxic and can be used and interpreted easily. The use of the term is also consistent with current European EN standards and RID/ADR.

5. The decision of OECD to introduce the term 'Discriminating Dose' or 'Fixed Dose' as a test of oral toxicity for $LD_{50,}$ may also affect the term *'highly toxic'*.

6. Provision should also be made for non-refillable and composite gas cylinders. The relevant European standards are prEN12205 for non-refillable cylinders, and prEN12245 and prEN12247 for composite gas cylinders. These could be used as a starting point for discussion

Proposal 3: Special packing provisions for dangerous goods of class 2 in chapter 4.1

7. **Regarding Paragraphs 9 to 11 and 15.**

a) The use of Safety Relief Devices (SRDs) promoted some discussion at the meeting of 5 to 8 July 1999, as there is a difference in philosophy between most of Europe and North America. The UK view is that SRDs should only be fitted to receptacles carrying liquefied flammable gases such as Liquefied Petroleum Gas (LPG). The justification for this lies in the number of recorded incidents where flammable gas receptacles fitted with SRDs have operated in a fire situation, dramatically reducing the hazard of cylinders either exploding or being propelled great distances.

b). Over a number of years, the UK has studied incidents where fires have taken place involving flammable gas receptacles. The UK Health and Safety Executive (HSE) have also conducted studies into the behaviour of flammable gas cylinders in a fire both with and without SRDs. These studies concluded that in the event of a fire, missile projection distances are far greater for LPG cylinders which were not fitted with SRDs than those which were fitted with SRDs. This data is also borne out by actual incident information. Two major incidents occurred in the UK in the mid 1990s where vehicles were involved in accidents. In both cases, the vehicles carried a number of LPG cylinders, some of which were fitted with SRDs and some not. The cylinders not fitted with SRDs exploded into many pieces and travelled great distances (~100m), whilst those fitted with SRDs either resisted explosion and remained intact, or were propelled a relatively short distance (<25m).

c). Also in the early 1970s, the UK Home Office conducted a number of fire tests of LPG cylinders involved in domestic and commercial fires. The overall conclusions were that the fitting of SRDs substantially reduced the risks of extensive fire and explosion. The results have been interpreted and published in a series of Codes of Practice published by the UK Liquefied Petroleum Gas Association (LPGA) and the UK Home Office Fire Service reports. Some examples of this guidance are;

i) The Fire Prevention Guide - Safe Use and Storage of Liquefied Petroleum Gas in Residential Premises (1976) ;

ii) LPG(RP)34 and LPG(RP)39 dealing with butane and propane respectively;

iii) Technical Memoranda from the LPGas Association - TM No.17 (1985) setting out a policy for the fitting of SRDs to LPG cylinders and - TM No.34 (1992)updating that policy;

iv) HSE Guidance Note CS4 (1986) dealing with the safe use of LPG cylinders.

d). In the previous document ST/SG/AC.10/C.3/1999/24, EIGA have stated that the risks arising from a leaking SRD far outweigh the potential benefits of SRDs during a fire. The UK disagrees with this statement as it does not take into account the storage and positioning of the cylinder or the reliability of SRDs. In the experience of the UK, SRDs fitted to LPG receptacles very rarely leak, and the benefits in the event of a fire are well known.

e). However, with other gases which are non-cryogenic, the UK supports the proposals for the removal of SRDs in gas receptacles. For example, with Acetylene, there is research and experience in the UK

which shows that in many cases SRDs either don't work or they provide the basis for feeding a fire. Tests carried out in 1994-95 by the UK Health and Safety Executive concluded that Acetylene cylinders fitted with fusible plugs could explode, before the fusible plug reached its operating temperature. Even when the fusible plug had operated, the cylinder could still explode. It was also found that Acetylene cylinders fitted with bursting discs could explode before the design pressure of the bursting disc was reached.

f). The UK therefore opposes the proposal not to fit SRDs to liquefied flammable gas cylinders. However, support is given to proposals to remove SRDs from all other gas cylinders, including Acetylene and those carrying toxic gases, with the exception of liquefied cryogenic gas receptacles (see Proposal 4).

g) It is generally accepted (internationally) that SRDs should not be fitted to any receptacles containing toxic gases, even where the gas has a subsidiary flammable risk. The UK supports this view.

8. **Regarding Paragraph 13 and Packing Instruction P200**

Referring to special provision "f" of P200, the stated maximum mass of contents (the 'filling factor') is for climatic area 1 and does not take into account the other two climatic areas. The filling factors for areas 2 and 3 are as follows;
i) For climatic area 2, the maximum mass of contents per litre of capacity equals 0.95 times the density of the liquid phase at 45^0C; in addition the vapour phase should not disappear below 55^0C.
ii) For climatic zone 3, the maximum mass of contents per litre of capacity equals 0.95 times the density of the liquid phase at 40^0C; in addition the vapour phase should not disappear below 50^0C.

9. In addition, entry UN 1965 "Hydrocarbon gas mixtures" is an NOS entry and calls for special requirements 'm' and 'z'. 200m is satisfactory, however, 200z(2) omits (f) for filling. This needs to be added after 200(6).

10. **Regarding Paragraph 18 and Packing Instruction P200**
The UK supports special provision "k" of P200, conditional to passing a stress corrosion test rather than a sustained load cracking test.

11. Table on Pages 13 to 21.
As the Table is extracted from Marginal 2250 of the ADR, the asterisks need to be clarified in a legend accompanying that Table as follows;
*/ = *Not applicable to receptacles made of composite materials.*
**/ on Page 13 = *Considered as pyrophoric*.
**/ on Page 19 = *For mixtures of gases of 20 F, UN1965, the maximum filling mass per litre of capacity is as shown in the graph* (this graph should be reproduced from Marginal 2250 of ADR).
***/ = *Considered as pyrophoric*.

12. Packing Instructions P201 and 202.
The UK feels that the appropriate gases should be referenced here as appropriate for each Packing Instruction, i.e. P201 for UN3167, 3168, 3169 and P202 for UN3353.

Proposal 4: Requirements for the construction and testing of pressure receptacles for gases including pressure receptacles which are elements of MEGCs.

13. **Regarding a new section (6.2.5) dealing with closed cryogenic receptacles.**

The UK recognises an omission in the UN paper to deal with closed cryogenic receptacles.

Therefore, the UK proposes an additional section using the relevant sections of ADR, i.e. from Section 6.2.3.4 of the restructured version of ADR. This would also incorporate the proposals contained in square brackets within section 6.2.1.3.4 of document ST/SG/AC.10/C3/32 Add 1, as follows;

Proposed additional section - 6.2.5 Closed Cryogenic Receptacles
The following requirements apply to the construction of closed cryogenic receptacles for gases of classification code 3:

6.2.5.1 All the mechanical and technological characteristics of the metal used shall be established for each receptacle at the initial inspection; with regard to the impact strength and the bending coefficient;

6.2.5.2 If other materials are used, they shall resist brittle fracture at the lowest working temperature of the receptacle and its fittings;

6.2.5.3 Receptacles shall be fitted with a safety valve which shall be capable of opening at the working pressure shown on the receptacle. The valves shall be so constructed as to work reliably even at their lowest working temperature. Their reliability of functioning at that temperature shall be established and checked by testing each valve or a sample of valves of the same type of construction;

6.2.5.4 The vents and safety valves of receptacles shall be so designed as to prevent the liquid from splashing out;

6.2.5.5 Receptacles whose filling is measured by volume shall be provided with a level indicator;

6.2.5.6 The receptacles shall be thermally insulated. The thermal insulation shall be protected against impact by means of continuous sheathing. If the space between the receptacle and the sheathing is air-less (vacuum insulation), the protective sheathing shall be designed to withstand, without deformation, an external pressure of at least 100kPa (1bar). If the sheathing is so close as to be gas tight (e.g. in the case of vacuum insulation), a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the receptacle or its fittings. The device shall prevent moisture from penetrating into the insulation.

Detailed measures to fulfil these general requirements should come from the appropriate codes and standards.

Proposal 7: requirements for the design, construction inspection and testing of MEGCs.

14. **Regarding Paragraph 35.**

UK industry operates many hundreds of MEGCs containing Hydrogen and CO. Each of these can hold up to 250 transportable pressure receptacles fitted in banks of 5000litres, and these arrangements have been in accordance with a UK Approved Code of Practice, published by HSE and the British Compressed Gases Association. It follows many years of safe operation of tube and receptacle trailers both in UK and much of Europe. In addition, CEN/TC23/SC3/WG5 is developing a standard which defines an isolation requirement of 5000litres and has been agreed by all participating European Member States. If a smaller limit of 3000litres was adopted, this would have a very large impact on UK and

European industry. Therefore the UK opposes the introduction of a reduction in quantities to be carried.

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