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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-fifth session, 5-14 July 2004
Item 3 (b) of the provisional agenda

EXPLOSIVES, SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

Ammonium nitrate emulsions

Proposal for a new UN number for Sensitized Ammonium Nitrate Emulsions, Suspensions and Gels

Transmitted by the expert from Sweden

Introduction

During the 23rd session of the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods (UNSCETDG) in 2003, a paper was presented by Spain (UN/SCETDG/23/INF.12) proposing that SP309 supporting UN No. 3375 for ammonium nitrate emulsions, suspensions and gels be modified to include chemical sensitizers such as sodium or potassium perchlorate, hexamine nitrate and/or monomethylamine nitrate. The paper was based on work carried out in Spain (UN/SCETDG/23/INF.32) on chemically sensitized suspensions all of which gave negative results in Test Series 8a, 8b and 8c, and in the modified vented pipe test (MVPT) proposed as Test Series 8d by Australia at the 21th session of the Sub-Committee in 2002 (UN/SCETDG/21/INF.69).

Subsequently, tests carried out in Australia (UN/SCETDG/24/INF.45) using the MVPT demonstrated that chemically sensitized suspensions show a distinctly and measurably different behavior from unsensitized emulsions. The chemically sensitized suspensions required a shorter time (by a factor of about a half) to show the same effect when heated in the MVPT, i.e. the effect of overflowing or venting the vessel. As well, this behaviour took place at a temperature from 110 to 120 degrees Celsius lower than that for unsensitized emulsions. This difference in behaviour was also observed during the Spanish MVPT trials. The expulsion of chemically sensitized suspensions in the early stages in the MVPT leaves the question of whether or not these substances can explode in an accidental fire unanswered. Both the Spanish and the

Australian MVPT work showed that chemically sensitized emulsions also required a shorter time to overflow, to vent and to rupture the vessel than unsensitized emulsions.
Since UN No. 3375 is centered on transport in bulk containers and its related hazards such as an accidental fire, the difference in behaviour of chemically sensitized versus unsensitized emulsions, suspensions and gels suggests that there will be a much shorter time for Emergency Responders to react to such an accident involving chemically sensitized materials. If, for example during road transport, the driver needs to be retrieved/extracted from the burning transport vehicle or members of the public need to be evacuated from the surrounding area, the window of opportunity appears to be considerably shorter with a bulk truck containing chemically sensitized emulsions, suspensions or gels than unsensitized materials based on observations made during the MVPT trials.

Proposal

It is proposed that a new UN number 3XXX, supported by a new entry Special Provision 3ZZ, be assigned to *chemically sensitized* emulsions, suspensions and gels under Class 5.

The new Special Provision 3ZZ for UN No. 3XXX would read:

"3ZZ This entry applies to chemically sensitized emulsions, suspensions and gels consisting primarily of a mixture of ammonium nitrate plus chemical sensitizing agents with a fuel phase, intended to produce a Type E blasting explosive only after further processing prior to use.

The mixture typically has the following composition: 60-85% ammonium nitrate; 0-5% sodium or potassium perchlorate; 0-17% hexamine nitrate or monomethylamine nitrate; 5-30% water; 2-8% fuel; 0.5-4% emulsifier or thickening agent; 0-10% soluble flame suppressants; and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate."

The new entry in the "Recommendations on the Transport of Dangerous Goods. Model Regulations" would read:

UN No	Name and description	Class or division	Subsi-diary risk	UN packing group	Special provi-sion	Limited quantities	Packing and IBC's		Portable tanks and bulk containers	
							Packing instruction	Special packing provisions	Instruc-tions	Special provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
3XXX	CHEMICALLY SENSITIZED AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blasting explosives	5.1		II	3ZZ	NONE	P099 IBC99		T1 T2	TP1 TP9 TP17 TP32

The existing Special Provision 309 for UN No. 3375 would remain unchanged, reading:

"309 This entry applies to non-sensitized emulsions, suspensions and gels consisting primarily of a mixture of ammonium nitrate and a fuel phase, intended to produce a Type E blasting explosive only after further processing prior to use.

The mixture typically has the following composition: 60-85% ammonium nitrate; 5-30% water; 2-8% fuel; 0.5-4% emulsifier or thickening agent; 0-10% soluble flame suppressants; and trace additives. Other inorganic nitrate salts may replace part of the ammonium nitrate."

It is proposed that the Test Series 8 be retained as part of the test regime for both unsensitized (UN No. 3375) and chemically sensitized (UN No. 3XXX) emulsions, suspensions and gels, at least for the current biennium. It may be appropriate to revise the supporting Test Series in the future in the light of any further new experimental information on the hazards of these materials.

Safety implications
Enhanced safety

Feasibility
No problems are foreseen

Enforceability
No problems are foreseen

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