

## 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  
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Item 3(b) of the provisional agenda

### EXPLOSIVES, SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

#### Classification of ammonium nitrate emulsions, suspensions and gels

Comments on documents ST/SG/AC.10/C.3/2003/31 and UN/SCETD/24/INF.18 from Spain

Transmitted by the expert from Canada

#### **Background**

During the twenty-first session of the Committee of Experts on the Transport of Dangerous Goods, December 2000, it was decided to create a new entry for AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blasting explosives (ANEs), in Division 5.1 (UN No. 3375). The purpose of this entry was to describe bulk explosives precursors that did not exhibit explosives properties as defined in Test Series 1 and 2, and would require sensitization to transform them into explosives of Class 1. To determine whether a substance may be classified under this new entry, a definition was drawn up limiting types and percentages of ingredients (Special Provision 309), and a new Test Series 8 was also included in the Manual of Tests and Criteria.

#### **Issue**

Several emulsion formulations have been tested in various countries and shown to be suitable for inclusion in the ANE category, both by the definition in Special Provision 309 and by the results of Test Series 8.

In December 2002 the Expert from Spain submitted a paper (UN/SCETDG/22/INF.4) showing that suspensions containing perchlorates and/or amine nitrates passed the Series 8 tests and requested that these results be included as examples of results of Series 8 tests. This proposal was not adopted, as the formulations did not conform to Special Provision 309. The Expert from Spain provided further test results to demonstrate that these suspensions were if anything less sensitive (according to Series 8) than emulsions which met the ANE definition (UN/SCETDG/23/INF.12) and proposed that SP 309 be modified to include the suspensions (ST/SG/AC.10/C.3/2003/13). He was asked to provide yet further information bearing on the safety and stability of these suspensions, and to re-submit his proposal with more restrictive formulation limits. This has now been done (UN/SCETG/24/INF.18 and ST/SG/AC.10/C.3/2003/31).

## Comments

Against this proposal, it can be argued that the ANE category was intended to include only formulations that do not contain sensitizers or energetic materials. The original wording of the Special Provision 306 was “non sensitized emulsion primarily consisting of...” The purpose of this SP was to limit the applicability of the UN No. 3375 to materials that clearly were insensitive and required some form of physical or chemical sensitization to become detonable. The addition of perchlorates and amine nitrates to emulsions is known to make them significantly more sensitive.

However, the results presented by Spain have demonstrated that suspensions, even those containing these substances, are generally less sensitive than unsensitized emulsions as demonstrated by the Series 8 test results. Thus the issue could be phrased, “Which should predominate, the definition or the test results?” The purpose of the definition was not to exclude any new formulations that do not conform to current technology, but rather to ensure that only products not likely to exhibit explosive properties be proposed as ANE candidates. The Expert from Canada believes the test results in this case are more meaningful than the definition, and that on this basis the proposal from Spain should be supported.

This debate illustrates again the difficulty of drawing a line between explosives and closely related precursor formulations. Ultimately it is the behaviour of the material that is important, and this must be determined by testing. Are the tests in Series 8 adequate to distinguish successfully between “explosives” and “non-explosives”? This is an issue the Experts should consider further.

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