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 **4 July 2019**
Fifty-fifth session
Geneva, 1-5 July 2019
Item 2 of the provisional agenda
Explosives and related matters

Report of the Working Group on Explosives

Transmitted by the Chairman of the Working Group

Introduction

1. The working group met from 1 – 4 July 2019 in a parallel session to the plenary meeting of the Sub-Committee of Experts on the Transport of Dangerous Goods. This meeting of the working group was well attended with 35 experts in attendance from Belgium, Canada, Finland, France, Germany, Japan, Netherlands, Poland, Republic of Korea, Spain, Sweden, United Kingdom, United States of America, Association of European Manufacturers of Sporting Ammunition (AFEMS), Australian Explosives Industry and Safety Group (AEISG), Council on Safe Transportation of Hazardous Articles (COSTHA), European Association of Automotive Suppliers (CLEPA), European Chemical Industry Council (CEFIC), Institute of Makers of Explosives (IME), and Sporting Arms and Ammunition Manufacturers' Institute (SAAMI). Annex 1 of this report provides a list of participants. The group was tasked to discuss technical matters related to official papers and to discuss informal papers as time allowed. Mr. Ed de Jong (Netherlands) served as chair of the working group and Mr. David Boston (IME) as secretary.

2. The working group met from Monday through Wednesday to consider the papers assigned to it by the Sub-Committee and on Thursday morning to review and approve this report. The latter half of Thursday was spent informally discussing other matters of interest. Those informal discussions are not reported herein. Throughout this report, the following abbreviations may be used:

- EWG – Working Group on Explosives
- GHS – Globally Harmonized System
- MR – Model Regulations
- MTC – Manual of Tests and Criteria
- TDG – Transportation of Dangerous Goods

3. The working group was tasked by the Sub-Committee to review the following documents:

Document	Title	Paragraph
Agenda Item 2(a)	Review of Test Series 6	
ST/SG/AC.10/C.3/2019/11 (SAAMI)	*Review of the criteria of Test 6 (d)*	*4*
Agenda Item 2(b)	Improvement of Test Series 8	
UN/SCETDG/55/INF.27 (IME)	*Recommendations on Test Series 8: Applicability of Test Series 8 (d)*	*5*
Agenda Item 2(c)	Review of tests in parts I, II and III of the Manual of Tests and Criteria	
ST/SG/AC.10/C.3/2019/6 – ST/SG/AC.10/C.4/2019/1 (CEFIC)	*Explanatory text about applicable temperature limits in Appendix 6 of the Manual of Tests and Criteria*	*6*

Document	Title	Paragraph
ST/SG/AC.10/C.3/2019/12 (SAAMI)	*Aligning the assessment with the purpose of Test Series 4(b)(ii)*	*7*
Agenda Item 2(h)	Review of Chapter 2.1 of the GHS	
ST/SG/AC.10/C.3/2019/32 - ST/SG/AC.10/C.4/2019/5 (Sweden)	*Development of a new Chapter 2.1 for the GHS (explosives)*	*8*
UN/SCETDG/55/INF.19 - UN/SCEGHS/37/INF.8 (USA, IME, SAAMI)	*Explosives classification in GHS Chapter 2.1*	*8*
UN/SCETDG/55/INF.20 - UN/SCEGHS/37/INF.9 (Sweden)	*Possible hazard communication elements for the classifications of the potential new GHS Chapter 2.1*	*8*
Agenda Item 2(i)	Energetic samples	
ST/SG/AC.10/C.3/2019/7 (CEFIC)	*Temperature control of energetic samples*	*9*
Agenda Item 2(j)	Issues related to the definition of explosives	
UN/SCETDG/55/INF.10 - UN/SCEGHS/37/INF.6 (Sweden)	*Amendments to the definition of explosive substance and definition of Class 1*	*10*
ST/SG/AC.10/C.4/2019/7 (SAAMI)	*Clarifications to the scope of the class of explosives*	*10*
UN/SCETDG/55/INF.35 - UN/SCEGHS/37/INF.14 (SAAMI)	*Clarifications to the scope of the class of explosives*	*10*
Agenda Item 2(l)	Miscellaneous	
ST/SG/AC.10/C.3/2019/13 (SAAMI)	*Clarification to the regulatory construct of Class 1 compatibility groups, taking into account group*	*11*
ST/SG/AC.10/C.3/2019/14 (SAAMI)	*Removing the net explosives mass documentation requirement for Division 1.4*	*12*
UN/SCETDG/55/INF.33 (Germany)	*Classification of a pyrotechnic article "Aquaflame"*	*13*
Agenda Item 7	Global harmonization of transport of dangerous goods regulations with the Model Regulations.	
UN/SCETDG/55/INF.30/Rev.1 (Secretariat)	*Harmonization of RID/ADR/ADN with the 21st revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations*	*14*

Agenda Item 2(a) – Review of Test Series 6

4. **Subject.** Test Series 6(d)

Documents: *ST/SG/AC.10/C.3/2019/11 (SAAMI)*

Informal documents: *None submitted*

Discussion: The proposal was reviewed by the EWG and there was some support in principle. In support of its proposal, SAAMI noted that the 6(d) criteria applied typically to only 12 of 35 classification code 1.4S entries (those to which SP 347 applies). In their opinion, this, in effect, creates two types of 1.4S explosive products: (1) those that are required to and (2) those that are not required to pass UN Test Series 6(d) and that a solution is needed. The EWG agreed that the 6(d) test is intended to identify hazardous effects outside of the package resulting from an accidental initiation but that the current criteria may be identifying any effects rather than just hazardous effects. Clear guidance is needed as to what hazardous effects the 6(d) test is meant to identify, and then the criteria should be reviewed and updated so that they relate solely to hazardous effects as opposed to effects in general.

Conclusion: An informal correspondence group (ICG) will examine the issue further and develop guidance as to what are to be considered hazardous effects and to refine the 6(d) criteria if

appropriate. In its review, the ICG will not consider the issue of whether an accidental initiation is, in fact, possible. The recommendations of the ICG will then be considered by the EWG and recommendations made to the sub-committee at a future session. SAAMI agreed to lead the ICG, expressed its appreciation for the guidance provided by the EWG and the proposed plan of action.

Agenda Item 2(b) – Improvement of Test Series 8

5. **Subject.** Test Series 8(d)

Documents: *None submitted*

Informal documents: *UN/SCETDG/55/INF.27 (IME)*

Discussion: The EWG was sympathetic to the proposal from IME to exempt from performance of the 8(d) test those ammonium nitrate emulsions, suspensions and gels that have been subjected to and passed the 8(e) test. The USA noted that the thickness of the container in the 8(d) test is greater than in the 8(c) Koenen test, and therefore questioned whether there was data to support the claims in para. 5 of INF.27 regarding false positives in the VPT. The USA also asked whether data could be provided comparing VPT and MBP Test results for emulsions, suspensions and gels covering a variety of different energy and sensitivity levels.

Conclusion: IME will provide the additional data to the EWG for consideration at a later session.

Agenda Item 2(c) – Review of tests in parts I, II and III of the Manual of Tests and Criteria

6. **Subject.** Temperature limits in MTC Appendix 6

Documents: *ST/SG/AC.10/C.3/2019/6 – ST/SG/AC.10/C.4/2019/1 (CEFIC)*

Informal documents: *None submitted*

Discussion: The proposal was thoroughly discussed by the EWG and it was recognized that there might be some problems that should be addressed. It was also noted that neither the current text nor the proposed new text solves the problems described by CEFIC in 2019/6. The question really comes down to whether there should be an upper temperature limit in DSC measurements taken as part of the screening procedures in Appendix 6 and recognition of peak measurements beyond 500°C.

Conclusion: CEFIC will consider the comments and will likely develop a new paper for a future session.

7. **Subject.** Test Series 4(b)(ii)

Documents: *ST/SG/AC.10/C.3/2019/12 (SAAMI)*

Informal documents: *None submitted*

Discussion: The EWG agreed that there is a problem with the wording of the 4(b)(ii) test introduction and the acceptance criteria for the test in that the former refers to a “significant” fire hazard and the latter, simply a fire hazard. However, there was no agreement as to what positive

and negative mean as used in the test description or to what the correct solution might be. It was suggested that limiting the scope of the proposal might assist in developing a path forward.

Conclusion: SAAMI will consider the comments and develop its proposal further.

Agenda Item 2(h) – Review of Chapter 2.1 of the GHS

8. **Subject.** Definitions, Classification Criteria, and Hazard Communication Elements

Documents: *ST/SG/AC.10/C.3/2019/32 - ST/SG/AC.10/C.4/2019/5 (Sweden)*

Informal documents: *UN/SCETDG/55/INF.19 - UN/SCEGHS/37/INF.8 (USA, IME, SAAMI)*
UN/SCETDG/55/INF.20 - UN/SCEGHS/37/INF.9 (Sweden)

Introduction: The following reports on EWG discussions on Tuesday and the joint EWG/ICG session on Wednesday afternoon. Document 2019/32 is a status report from the ICG chair that provides some background on the review, an update on the status, and the program of work as agreed at the end of the previous biennium. It was briefly reviewed by the ICG chair but not discussed further. INF.20 was not discussed during the formal discussions of the EWG or the joint EWG/ICG.

Discussion: INF.19 was reviewed in detail during the EWG session on Tuesday and continued during the joint EWG/ICG session on Wednesday with a view to refine the draft proposals in the document. This document presents recommendations for improved definitions, other general information, and classification considerations. The following summarizes key points from both review sessions, for consideration in a future revised GHS Chapter 2.1:

Definitions and general considerations

- Section 2.1.1.1 (definitions)
  - Where definitions were shortened, unused text was recommended for use in an amended 2.1.4 guidance section.
  - "Explosive article" – rejected the proposal to change the wording "an article" to "a device"
  - "Pyrotechnic article" – accepted deletion of this definition
  - "Configured for transport" – revised to read as follows

    Configured for transport refers to the complete package or unpackaged article as presented for classification and assigned a class or division or exempted, also meeting any associated requirements, according to the UN Recommendations on the Transport of Dangerous Goods, Model Regulations and Manual of Tests and Criteria.

  - "Detonation" – rejected definition.
  - "Primary packaging" – – revised to read as follows

    The primary packaging is the minimum level of packaging in which the explosive is intended to be retained until use.

  - "Packaging independent" – Since the criteria for sub-categories 2B and 2C refer to this term it was agreed that it must be defined. The proposed definition was not supported and was replaced with the following:

Packaging-independent refers to an explosive where the classification is not affected by and does not depend upon the packaging containing the explosive.

- "Staging" – suggested moving this to the guidance section (section 2.1.4)
- "Use" – no objections to definition as proposed
- Terms not listed above – existing text in the GHS. No changes proposed.

- Section 2.1.1.2 – added "Except as noted in section 2.1.1.3" to the beginning of the section. This section defines the "class of explosives" and section 2.1.1.3 describes exclusions from the "class of explosives"

- Section 2.1.1.3 – The section needs further review including some way to include self-reactives and organic peroxides in the section.

Classification Criteria (Section 2.1.2)

- Section 2.1.2.1 – amended the criteria in the table, added a new note, and deleted the note proposed in INF.19 as shown below:

Category	Criteria
1	Explosive substances, mixtures, and articles that have not been assigned to a division in accordance with Part I of the *UN Manual of Tests and Criteria*, or are out of the configuration in which a division was assigned.
2	Explosive substances, mixtures, and articles that have been assigned to a division in accordance with Part I of the *UN Manual of Tests and Criteria*.

Note: Assigning a division normally requires the explosive to be configured for transport and is valid in that configuration only.

Category 1 (Section 2.1.2.2) – Category 1 was discussed during the joint EWG/ICG session on Wednesday afternoon. Much of the discussion was about whether Test Series 1 (as proposed in INF.19) or Test Series 2 (as currently in the GHS) should be used as the entry point for substances and mixtures not manufactured with a view to producing a practical explosive or pyrotechnic effect into the Class of Explosives. The EWG/ICG agreed that TS2 should be used as the entry point and that any other explosive properties (such as detonation, deflagration, thermal explosion, and heating under confinement) should be reported in the SDS.

Category 2 (Section 2.1.2.3) – Category 2 was discussed by the EWG on Tuesday and by the joint EWG/ICG on Wednesday afternoon. The following summarizes consolidated outcomes from both discussions:

- Agreed to 2.1.2.3.1 as proposed
- 2.1.2.3.2 – Accepted 2A criteria with the following amendments:
  - Sub-para. (b) - changed "failed to meet the criteria" to "not meeting the criteria"'
  - Added new sub-para. (c) that reads, "Division 1.4 and that detonate and disintegrate when functioned as intended". Explosives meeting this description will also be included in category 2A (high hazard). Renumbered proposed sub-para. (c) to (d).
- 2.1.2.3.2 – Accepted 2B criteria as proposed
- 2.1.2.3.2 – Accepted 2C criteria (a) and (b) only; criterion (c) rejected because it was moved to 2A (the new sub-para. (c) noted above).

- Section 2.1.2.3.2.1 - accepted as proposed
- Section 2.1.2.3.2.2 - accepted as proposed

Conclusion: Progress continues in the review and the commitment remains to complete the review within the current biennium.

Agenda Item 2(i) – Energetic samples

9. **Subject.** Temperature control of energetic samples

Documents: *ST/SG/AC.10/C.3/2019/7 (CEFIC)*

Informal documents: *None submitted*

Discussion: The EWG supported the proposal in principle and noted that it was a good and simple solution. However, before endorsing the proposal, more supporting data and/or examples should be provided for EWG review. Additionally, the EWG recommended deletion of the word "extrapolated" in the proposed text in para. 24 of the paper.

Conclusion: CEFIC will prepare a paper with more supporting data and/or examples for a later session.

Agenda Item 2(j) – Issues related to the definition of explosives

10. **Subject.** Definition of explosive substance and Class 1

Documents: *ST/SG/AC.10/C.4/2019/7 (SAAMI)*

Informal documents: *UN/SCETDG/55/INF.10 - UN/SCEGHS/37/INF.6 (Sweden)*
UN/SCETDG/55/INF.35 - UN/SCEGHS/37/INF.14 (SAAMI)

Discussion: The EWG reviewed the proposals in C.4/2019/7 and INF.10 (INF.35 was simply a reference to C.4/2019/7 and was not discussed). While there was no agreement with the proposals in either paper, the EWG acknowledged that there may be some problems with the definitions of "explosive substance" and "Class 1" and that changes may be needed. However, the issue was deemed too complicated for work within the EWG due to the limited number of sessions it meets during a biennium. Therefore, an ICG was established to review the matter in detail and to report back to the EWG. The ICG will be led by Sweden with the following remits:

- Identify more clearly what the issues are and if a change is needed
- Establish a hierarchy so that intentional explosives are included regardless of Test Series 1 or 2
- Align with the flowcharts
- Development of simultaneous solutions for both TDG and GHS
- Consider legal implications and seek to eliminate or constrain them as much as possible
- Develop definitions that are reasonable and easy to understand
- Consider potential impact upon national and intermodal regulations
- No changes to the scope
- Consider and correct or avoid unintentional consequences

Conclusion: The ICG will work intersessionally with the goal of presenting recommendations to the EWG at its next meeting. It was emphasized that this work, although related, is not to be part of the GHS chapter 2.1 review.

Agenda Item 2(l) – Miscellaneous

11. **Subject.** Class 1 compatibility groups

Documents: *ST/SG/AC.10/C.3/2019/13 (SAAMI)*

Informal documents: *None submitted*

Discussion: The proposals in paragraphs 15 and 16 were not adopted as written, but it was agreed that 1.4S classifications are conservatively assigned and controlled during transport, resulting in 1.4S being safe. The investment of placing explosives into packaging that greatly mitigates hazard is a benefit to all that should be recognized and encouraged. As a result, the EWG agreed that some note, similar to those found in IMO port guidance and other references, encouraging favorable facilitation of 1.4S shipments would be helpful. However, the EWG was unsure whether that note should appear within the MR or in the Recommendations, and guidance from the sub-committee is sought in this aspect. SAAMI prepared suggested text for the note that reads:

> *Class 1.4S products are by design/definition extremely safe for transport. Competent authorities should facilitate the expeditious handling and shipment of division 1.4S materials.*

The proposal in para. 17 was supported as written. The proposal in para. 18 was supported in principle, but it was determined that additional thought should be given to the location of modified text, and that pending amendments for Rev 7 of the MTC should be taken into consideration.

Conclusion: The EWG seeks guidance from the sub-committee as to where such a note on facilitation, if approved, should appear. Based on that guidance, as well as study for the placement of the proposal in paragraph 18, SAAMI will prepare a proposal for a future session.

12. **Subject.** Documentation requirements for Division 1.4

Documents: *ST/SG/AC.10/C.3/2019/14 (SAAMI)*

Informal documents: *None submitted*

Discussion: Opinions were divided regarding the proposal in 2019/14; however, the EWG offered, and SAAMI took note of, comments to address the concerns raised by SAAMI in the paper.

Conclusion: SAAMI may prepare a new proposal for a future session.

13. **Subject.** Classification of a pyrotechnic article

Documents: *None submitted*

Informal documents: *UN/SCETDG/55/INF.33 (Germany)*

Discussion: The EWG offered several suggestions to Germany as to how to handle the classification issue presented in INF.33 including:

- Assignment to compatibility group G with specific notation in the approval addressing appropriate segregation requirements
- Assignment to UN0356 (Articles, explosive, n.o.s., 1.3L)
- Assignment into classification code 1.4S if possible
- Assignment into compatibility group G based on packaging to negate likelihood of water contacting the article

Conclusion: Germany will consider the suggestions offered by the EWG as it determines the classification of the noted pyrotechnic article.

Agenda Item 7 – Global harmonization of transport of dangerous goods regulations with the Model Regulations.

14. **Subject.** Harmonization of RID/ADR/AND with 21st Rev. of the Model Regulations

Documents: *None submitted*

Informal documents: *UN/SCETDG/55/INF.30/Rev.1*

Discussion: The EWG chair reviewed the revised text proposed to 2.1.3.5.2 of the 21st Rev of the MR found in the Annex to INF.30/Rev.1. He reported that the proposed revisions simply improved the wording and did not change the meaning.

Conclusion: No issues with the proposed revisions.

Annex 1
Working Group on Explosives (1 - 4 July 2019)
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