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 **25 June 2015**

Forty-seventh session

Geneva, 22 – 26 June 2015
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 on Explosives

Introduction

1. The working group met from 22 to 25 June 2015 in a parallel session to the plenary meeting of the Sub-Committee on the Transport of Dangerous Goods. This meeting of the working group was well attended with 35 experts in attendance from Australia, Belgium, Canada, Finland, France, Germany, Italy, Japan, the Netherlands, New Zealand, Spain, Sweden, Switzerland, the United Kingdom, the United States of America, the GHS Secretariat, AEISG, CEFIC, CLEPA, IME, RPMASA, and SAAMI. A list of participants is provided in Annex 1 to the report. 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 following papers were discussed.

Document	Title
Agenda Item 2	Explosives and related matters
ST/SG/AC.10/C.3/2015/1 - (WG Chairman)	*Guidelines on working procedures for the working group*
Agenda Item 2(a)	Tests and criteria for flash compositions
ST/SG/AC.10/C.3/2014/72 - (Japan)	*Proposals on the apparatus, materials and criteria of US- and HSL Flash Composition Tests*
ST/SG/AC.10/C.3/2015/12 - (UK)	*The effectiveness of US and HSL modified plugs for the HSL flash composition test*
UN/SCETDG/47/INF.28 - (Japan)	*Revised proposals on US- and HSL Flash Composition Tests (ST/SG/AC.10/C.3/2014/72)*
Agenda Item 2(b)	Review of Test Series 6
UN/SCETDG/47/INF.10 - (IME)	*Recommendations for improvement of the Series 6 Tests*

Document	Title
Agenda Item 2(c)	Review of tests in parts I and II of the Manual of Tests and Criteria
ST/SG/AC.10/C.3/2015/2 - (IME & AEISG)	*Recommendations for improvement of series 8 (c) Koenen Test*
UN/SCETDG/47/INF.3 - (IME & AEISG)	*Additional Technical Background for the Explosives Working Group*
UN/SCETDG/47/INF.40 - (France)	*Improvement of Series 8(c) Koenen Test, Proposal for calibrating the heating rate*
ST/SG/AC.10/C.3/2015/4 - (Germany)	*Test results relating to the Koenen test*
ST/SG/AC.10/C.3/2015/26 - (Germany)	*New design for the standard detonator in the Manual of Tests and Criteria*
UN/SCETDG/47/INF.37 - (Germany)	*Supporting material for the new design proposal for the standard detonator in the UN Manual of Tests and Criteria*
Agenda Item 2(d)	Review of packing instructions for explosives
No documents	
Agenda Item 2(e)	Harmonized standard for security markings
UN/SCETDG/47/INF.9 - (IME) (discussed under agenda item 2(i))	*Considerations for a formal proposal for the forty-eighth session*
Agenda Item 2(f)	Classification of fireworks
No documents	
Agenda Item 2(g)	Classification of articles under UN 0349
ST/SG/AC.10/C.3/2014/86 - (Italy)	*Classification of articles under UN No. 0349*
UN/SCETDG/47/INF.47 - (Italy)	*Additional information related to the document ST/SG/AC.10/C.3/2014/86 (Italy)*
Agenda Item 2(h)	Review of Chapter 2.1 of the GHS
ST/SG/AC.10/C.3/2015/27 - (SAAMI)	*GHS Classification of explosives*
UN/SCETDG/47/INF.23 - (Australia)	*Review of Chapter 2.1 of the GHS*
Agenda Item 2(i)	Miscellaneous
ST/SG/AC.10/C.3/2015/10 - (AEISG)	*Ammonium nitrate emulsions (UN3375) – Special provision 309*
ST/SG/AC.10/C.3/2015/13 - (SAAMI)	*Analogy approvals based on test results obtained using the Manual of Tests and Criteria*
UN/SCETDG/47/INF.8 - (Spain)	*Transport of PENTAERYTHRITE TETRANITRATE (PETN) with less than 25 % of water but more than 9% of water*
UN/SCETDG/47/INF.29 - (CEFIC)	*Transport of energetic samples for further testing*
UN/SCETDG/47/INF.38 - (Sweden)	*Include UN No. 0339 in the list of high consequence dangerous goods in Section 1.4.3*
UN/SCETDG/47/INF.41 - (USA)	*Transport provisions for UN0501 propellant, solid 1.4C*
UN/SCETDG/47/INF.50 - (USA)	*Classification Procedures Relating to Liquid and Solid Desensitized Explosives Under UN 3379 and UN 3380, and Criteria for Exclusion of Energetic Substances*
Agenda Item 10(g)	Miscellaneous
UN/SCETDG/47/INF.6 - (Netherlands)	*Remarks on the use of the Manual of Tests and Criteria in the context of the GHS*
UN/SCETDG/47/INF.21 - (Working Group Chair)	*Remarks on the use of the Manual of Tests and Criteria in the context of the GHS*
UN/SCETDG/47/INF.31 - (Canada)	*Comments on the use of the Manual of Tests and Criteria in the context of the GHS: Introduction of the Manual*
UN/SCETDG/46/INF.44 - (Secretariat)	*Use of the Manual of Tests and Criteria in the context of the GHS*
ST/SG/AC.10/C.3/2014/61 - (Secretariat)	*Use of the Manual of Tests and Criteria in the context of the GHS*
UN/SCETDG/45/INF.8 - (Secretariat) + Adds. 1 - 5	*Use of the Manual of Tests and Criteria in the context of the GHS: Proposed amendments to the Appendices of the Manual*

Agenda Item 2 – Explosives and related matters

3. **Subject:** Guidelines on working procedures for the working group

Documents: *ST/SG/AC.10/C.3/2015/1 - (WG Chairman)*

Informal documents: *None*

Discussion: The chairman reviewed the need for guidelines to make the work and the reporting of the working group more efficient and manageable. It was also noted that some proposals for the current session weren't presented in revision tracking format; however, strict adherence to the guidelines for this session did not serve as an impediment to consideration of those proposals. The chairman requested that future proposals adhere more closely to the guidelines to make their consideration and inclusion in future reports more efficient.

Conclusion: The working group acknowledged the need for guidelines and agreed to try to work within those proposed by the chairman.

Agenda Item 2(a) – Tests and criteria for flash compositions

4. **Subject:** The effectiveness of US and HSL modified plugs for the HSL flash composition test

Documents: *ST/SG/AC.10/C.3/2014/72 (Japan)*
ST/SG/AC.10/C.3/2015/12 - (UK)

Informal documents: *UN/SCETDG/47/INF.28 - (Japan)*

Discussion: 2014/72 and INF.28: At the 45th session, in INF.19, Japan reported on experiments of US and HSL tests for various fireworks compositions and provided possible solutions for issues on the apparatus, materials and appropriate criteria of US and HSL tests. The Working Group on explosives generally supported the proposals in informal document INF.19 of the 45th session and concluded to ask Japan to prepare a formal proposal by taking account of its comments. Japan presented its formal proposal in 2014/72 at the 46th session and that paper was referred to the working group for consideration during the current session. Based on comments at the 46th session and at the IGUS/EPP meeting in March 2015, Japan has revised its proposals of 2014/72 somewhat and the revised proposals have been provided in INF.28.

The working group limited its review of the proposals from Japan to those contained in INF.28 since that was an update to the proposals in 2014/72 taking account of comments received at the 46th session. The UK and USA supported the proposals in INF.28 related to the two versions of test. The working group concurred that the proposals were acceptable and Japan agreed to submit the proposals in INF.28 in a formal paper for the next session.

2015/12 reports on tests performed in the USA, Japan, and the UK on a range of compositions using the United States of America modified plug to demonstrate the reproducibility of results from different laboratories. The UK also ran comparison tests with its own improved design. The compositions used were provided by the UK in an attempt to eliminate any variability due to raw materials or manufacturing process. The tests have been completed and results were provided in the annex to 2015/12. The inter-laboratory testing indicates that there appears to be variation in the results between laboratories. Although the US and the UK modified plugs could not be shown

to improve the consistency of results their use improves handling and reduces the time taken conducting tests.

The UK noted that the use of the modified plugs proved to be simpler and more desirable than the plugs currently described in the test. The working group expressed concern, however, about the variability of results in the comparison tests and recommended that study of the two tests continue. Sweden suggested that the test scale may be too small and suggested that an increase in sample size may help with the variability issue. Also, Canada offered to share data from its comparison tests once those comparisons are completed and results tabulated. Noting that the changes proposed by Japan in INF.28 would be formally submitted at the next session, the UK recommended acceptance of the changes related to the plugs now and continuance of work to try to resolve the issue of the variability within the tests during the current biennium.

Conclusion: The working group supported the changes proposed in INF.28. Japan will submit a formal proposal for the 48th session.

The UK will prepare a formal proposal for acceptance of the modified plug design for consideration at the 48th session and will continue investigating the variability issue.

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

5. **Subject:** Recommendations for improvement of Test Series 6

Documents: *None*

Informal documents: *UN/SCETDG/47/INF.10 - (IME)*

Discussion: At the 45th session in 2014/4 IME identified some issues related to the improvement of the series 6 tests. Some of these were relatively easy to fix and IME made proposals addressing those. For the most part, these proposals were accepted by the Sub-committee and will be included in the 6th revision of the Manual of Tests and Criteria (MTC). However, IME also identified issues that need further review and possibly testing to resolve and suggested that these be worked on during the present biennium. In INF.10, IME brings attention to and comments on these remaining issues and invites the working group to develop plans to resolve them.

The working group appreciated the review of long-term issues related to the improvement of TS6 and provided the following comments:

Para. 3 – the working group agreed that retention of the transport nature of TS6 is a very important issue and should be kept in mind as the review of introduction of GHS context into the MTC proceeds.

Para. 4 – the working group supported IME's suggestion that new tests for purposes other than transport could be developed, if needed, and should be placed in a new part to the MTC. This will most likely be considered, as needed, as part of the GHS context review.

Para. 5 – the working group agreed that preparation of some sort of notes describing how TS6 was developed was desirable. A small working group was asked to prepare something for the working group to consider at a future session. The working group will consist of IME, SAAMI, Germany, France, the UK, and the Netherlands.

Para. 6 – the working group did not agree that guidance was needed regarding applicability of the tests in instances where it can be confirmed that function in the transport package is not possible.

Para. 7

i. The working group was of the opinion that the term "mass explosion" is adequately defined and that no further review is necessary.

ii. Regarding the review of the standard detonator, the working group noted that Germany has provided a proposal regarding the European version (see also para. 7 of this report). IME advised that it has begun a review of the US version and hopes to have something for the working group to review at the 48th session. Canada advised that it would like to participate in the IME review of the USA version.

iii. See ii. above

iv. The working group agreed with IME that the issue of examples had been adequately resolved during the 45th session in response to a proposal from SAAMI. IME agreed to develop some additional examples of 6(a) passes and failures and to provide these for consideration at the 48th session.

Para. 8 – the working group concluded that the 6(b) acceptance criteria were acceptable as currently written. IME agreed to develop some examples of passes and failures of the 6(b) test and to include them in the work described in Para.7 iv. above.

Para. 9 – The working group noted the recommendations in para. 9 of INF.10; however, no specific work plans were developed.

Para. 10 – IME agreed to provide more information to the working group at the 48th session regarding the issues discussed in para. 10 of INF.10. The working group will then consider what plan of action may be appropriate.

Conclusion: The working group will revisit the listing provided by IME during the 48th session. Work will continue on the review of Test Series 6 as described above.

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

6. **Subject:** Koenen Test

Documents: *ST/SG/AC.10/C.3/2015/2 - (IME & AEISG)*
ST/SG/AC.10/C.3/2015/4 - (Germany)

Informal documents: *UN/SCETDG/47/INF.3 - (IME & AEISG)*
UN/SCETDG/47/INF.40 – (France)

Discussion: In 2015/2, IME & AEISG identify a problem with the 8(c) version of the Koenen test that is used to assess suitability of ANEs to be transported in Division 5.1 (UN3375) rather than as a Class 1 explosive. The Koenen test was developed for testing of explosives that react much more quickly than the relatively insensitive ANEs. The procedure calls for the steel tube containing the sample to be heated until it fails (a positive test result) or for at least 5 minutes. Research by IME & AEISG indicates that the prolonged heating of the steel tube weakens it

sufficiently that once the ANE being tested has reacted the tube fails appearing to show a positive result even though the rate of pressure rise is very low; i.e., the result is a false positive. This gives the false appearance of a positive result, which would exclude the ANE from UN3375. Therefore, IME & AEISG have proposed reducing the time of heating in the 8(c) test to not more than 30 seconds. In INF.3, IME & AESIG present the results of their research to support their proposal in 2015/2.

The general consensus of the working group was that the Koenen test is not suitable for evaluating ANEs and that IME and AEISG should consider research into what test might be a suitable replacement. One alternative to be considered is the Minimum Burning Pressure (MBP) test. Additionally, it was agreed that the steel does weaken after prolonged heating and that the weakening of the tube would affect reliable outcome of the test. Some of the working group supported a revision of the time specification of the test to some appropriate level; however, others did not agree and some asked for additional clarification as to what impact on safety might be expected if a time limit were imposed. The working group discussed changing the limiting diameter and consideration of the MBP as possible ways forward. However, upon further review, it was determined that changing the limiting diameter was not an appropriate solution. IME and AEISG will consider the working group comments and will submit a revised proposal at a future session.

2015/4 refers to all versions of the Koenen test, i.e., 1(c), 2(b), 8(c), and E.1. The Koenen test procedures specify use of a tube with a bursting pressure of 30 MPa ± 3 MPa; however, the steel used to produce such a tube is no longer available. Tubes constructed of currently available sheet steel yield bursting pressures of 25.2 – 25.9 MPa, which is outside the test specification. Germany reports on tests comparing the results obtained with the specified (30MPa) tubes with those currently in use (25.2 – 25.9 MPa) and concludes that results were comparable and; therefore, proposes to revise the bursting pressure specified in the Koenen test procedures from 30 MPa ± 3 MPa to 28 MPa ± 4 MPa. This change would bring tubes constructed of currently available sheet steel into conformance with the test procedure while still yielding results comparable to the test as originally developed.

The working group acknowledged the problem described in 2015/4 and appreciated the work done by Germany in researching possible alternative to the steel specified for tube construction in the Koenen tests. Both Germany and CEFIC have done comparison tests with the old tubes and new tubes and have found the results comparable. While it acknowledged the urgent need for replacement material because of the unavailability of the specified steel, the working group did not feel that the impact of a new specification for the tube had been completely examined and suggested that Germany consider the following:

- UK, CEFIC, and IME suggested running comparison tests on pharmaceutical samples and ANE samples

- Identify borderline materials and examine the impact on them. While the Netherlands felt that identification of borderline materials might be difficult, both CEFIC and UK advised they were aware of borderline examples and would furnish that information to Germany for consideration.

- IME suggested that a comparison of the metal properties of the new steel with those of the old steel might help make the case that the difference between the two was insignificant.

INF.40: Dibutyl phthalate (DBP) is used in the test for calibrating the heating rate in the 1(b), 2(b), 8(c), and E.1 Koenen tests. DBP is forbidden for general use within the EU because it has been identified as substance of very high concern within the EU's REACH regulation. France has

been coordinating work with 18 laboratories in 9 countries trying to identify a suitable replacement for DBP with vegetable oils in a second step with mineral or silicone oils. The result of this work indicates that certain oils are suitable replacements for DBP. In INF.40, France proposes to remove the DBP specification and to replace it with a more general specification calling for use of "oil, vegetable or mineral or silicone of suitable properties (e.g. low flammability, thermal resistance and stability) for that purpose."

The working group suggested that the use of synthetic oils rather than natural oils might be a viable solution to the problem described by France in INF.40. The working group also agreed that single specification was essential. France advised that it will continue researching solutions and the working group was encouraged to also do some research and to share their results and recommendations with France for development of a proposal once an acceptable single replacement has been identified.

Conclusion: IME and AEISG will consider the comments of the working group and will prepare a revised proposal for a further session. Germany will continue its research into replacement materials for the unavailable tube steel. France will continue its search for a suitable replacement for DBP taking into account the heat capacity as part of the specification.

7. **Subject:** UN standard detonator

Documents: *ST/SG/AC.10/C.3/2015/26 - (Germany)*

Informal documents: *UN/SCETDG/47/INF.37 - (Germany)*

Discussion: One of the longer term problems identified by IME in 2014/4 of the 45th session, and discussed in INF.10 above (see para.6) was the lack of availability of detonators meeting the specifications of the standard detonator that is described in Appendix 1 of the MTC. In 2015/26, Germany seeks to update the specifications for the European version of the standard detonator to allow more flexibility in detonator selection while seeking to avoid "… any change to the performance of the detonator, since test results should not depend on the use of the former type or the new type." Germany notes that Appendix 1 describes both a European and an US version of the standard detonator, limits its proposal to the European version, and suggests that the concepts it presents in 2015/26 be reviewed in relation to the US version. IME advised that a working group within its UN committee has been tasked with review of the US version and expects to report results at the 48th session.

In INF.37, Germany further examines the principles behind the standard detonator. Germany also examines the inconsistent use of terms referring to detonators (for example, "standard detonator", "No. 8 detonator", or simply "detonator") and proposes some changes to make these descriptions more standardized based upon the intended purpose of the detonator in each test in which it is specified.

In general, the working group supported the work already done by Germany to improve the specification for the European version of the standard detonator and encouraged IME to complete its review of the USA version by the 48th session. It was suggested and the working group generally agreed that it would be desirable to have a single UN standard detonator that could be used worldwide rather than a European and USA version. This would have to be carefully researched as some tests call for use of either the European or USA version specifically and others make no distinction. Germany and IME were asked to consider this aspect as part of their research.

Regarding the German proposal, no decision was taken as there were too many issues to be resolved and in hopes that Germany and IME could come up with a single specification for a standard detonator that would be commercially available. Germany and IME were asked to consider the following:

- Regarding the protective tube inside the detonator, replace the specification of "steel" with "metal".
- AEISG suggested to consider the possibility of further simplifying the specification as it felt that the German proposal (as well as the current standard) was over specified and the working group was currently reviewing the explosives tests with the intent of eliminating over specifications.
- Consider a detonator strength specification rather than design specification for the standard detonator.
- Consider other types of initiation systems such as non-electrics in addition to electric detonators.

Conclusion: Germany and IME will consider the comments of the working group and continue their research into a suitable alternative for the current standard detonator.

Agenda Item 2(d) – Review of packing instructions for explosives

8. No documents were submitted

Agenda Item 2(e) – Harmonized standard for security markings

9. INF.9 (IME) of Agenda Item 2(e) was discussed under Agenda Item 2(i). Please see paragraph 17 below.

Agenda Item 2(f) – Classification of fireworks

10. No documents were submitted

Agenda Item 2(g) – Classification of articles under UN 0349

11. **Subject:** UN0349 articles that may be subject to Chapter 1.4 security requirements

Documents: *ST/SG/AC.10/C.3/2014/86 - (Italy)*

Informal documents: *UNSCETDG/47/INF.47 (Italy)*

Discussion: Some explosives, that by their classification into certain divisions of Class 1, are subject to the security requirements of Chapter 1.4 of the Model Regulations. In 2014/86, Italy observes that some of these explosives may be repackaged in such a manner as to reclassify them under 1.4S following the requirements laid down in para. 2.1.2.1.1 using the only two UN numbers available (UN0349 or UN0481), thereby removing them from coverage under Chapter 1.4. This is undesirable because the repacking that resulted in classification into UN0349 or

UN0481 does not mitigate the security nature of the explosive that caused it to be under Chapter 1.4. Italy proposes two new entries and two new Special Provisions to correct this problem.

INF.47 provides additional editorial details that Italy felt would be useful to the EWG as it considers 2014/86.

The working group recalled that it had observed during the 45th session that the issue described was part of a much larger issue in that there are other explosives in the Table 1.4.1 of the Model Regulations that, when packaged appropriately, could be classified into Division 1.4 and 1.4S and would no longer be subject to the security provisions of Chapter 1.4. In addition, other explosives classified as Articles, Explosive, n.o.s., could attract security provisions which are not currently specified. It considered some possible solutions including:

- Addition of some security provision(s) to special provision 178,
- Provision of some guidance in Chapter 1.4 on how to deal with Table 1.4.1 explosives that might drop out because of packaging,
- Creation of specific entries to deal specifically with the problem items,
- Inclusion of a note on the approval document stating that the assignment of the approved security-sensitive articles was also subject to the security requirements of Chapter 1.4 of the Model Regulations.

Just as the proposal from Italy presented some problems, each of the above also had their value and their drawbacks, so none was deemed preferable. The working group highlighted that the high consequence dangerous goods list was indicative and it was open to the Competent Authority to add or subtract from that list and hence require the provisions of Chapter 1.4,

It was also observed by Canada that the issue of what items are considered security sensitive is often addressed by specific national legislations and not by transport classifications.

Conclusion: While there was sympathy for the problem described by Italy in 2014/86 and INF.47, opinions in the working group were divided and it could not come up with a consensus. Italy would like clear instructions from the sub-committee as to how to proceed next.

12. **Subject:** Include UN No. 0339 in the list of high consequence dangerous goods in Section 1.4.3

Documents: *None*

Informal documents: *UN/SCETDG/47/INF.38 - (Sweden)*

Discussion: Similar to the issue raised by Italy regarding UN0349 (see para. 12 above), Sweden has identified an issue with cartridges with armour-piercing capacity that are typically assigned UN0417 (1.3C), which is subject to the security requirements of Chapter 1.4 of the Model Regulations. However, with packaging, the transport classification of these devices could be UN0339 (1.4C) which is not subject to Chapter 1.4, even though the articles themselves are still a security concern. Sweden proposes to add UN0339 to Table 1.4.1.

There was little support for the proposal in INF.38. Canada observed that the issue is controlled by their national legislation and inclusion in Chapter 1.4 of the Model Regulations would conflict with some of their security requirements. SAAMI observed, and Canada concurred, that “armour

piercing ammunition" is a political term and that there are no technical criteria which could be considered by the working group.

Conclusion: The working group did not endorse the proposal to add UN0339 to the indicative list; however, Sweden will consider the comments of the working group and may return with a revised proposal at a later date.

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

13. **Subject:** Review of Chapter 2.1 of the GHS

Documents: *ST/SG/AC.10/C.3/2015/27 - (SAAMI)*

Informal documents: *UN/SCETDG/47/INF.23 - (Australia)*

Discussion: 2015/27: As part of the review of Chapter 2.1 of the GHS, in 2015/27, SAAMI seeks to provide some clarification of the GHS approach to explosives classification by noting that, unlike other chemicals that are classified by their intrinsic properties, other factors such as inclusion within an article and packaging may affect the classification of explosives. Further, SAAMI proposes that the decision logic of the MTC be referred to and that duplicative logic be removed from the GHS.

2015/27, para. 9: In general, the working group supported the principle in this proposed amendment. The intent is to reinforce the concept that classification of explosives is based not only on intrinsic properties but also upon things such as packaging, amount of explosive, and inclusion of explosives within articles. There was some concern about the use of the phrase "alternative classification principles" as both regimes classify based upon hazard. Some of the working group preferred a reference to "additional classification principles"; however, the working group decided that the wording proposed in para. 9 is acceptable for now, as it will likely be further reviewed and possibly improved by the GHS during its 27th session.

2015/27, para. 10: The working group agreed that this proposed amendment is merely a consequential change in anticipation of changes to be made in accommodating the GHS within the MTC.

2015/27, para. 11: The working group agreed with SAAMI that duplication of the flowcharts in section 2.1.4.1 complicates amendments to the MTC because of the need to repeat those references duplicated in the GHS. The majority of the working group instead preferred a single source for those references within the MTC and a statement to direct the reader to the appropriate reference in the MTC. AEISG suggested that a new paragraph be added to the end of section 2.1.4.1 of the GHS to direct the reader to the appropriate section of the MTC for the flowcharts and then to remove the flowcharts from section 2.1.4.1 as proposed by SAAMI in para. 11. The new paragraph would read, "The current decision logic for the classification of explosive substances, mixtures and articles as prescribed above are located in Sections 10.3 and 10.4 of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria. They are not provided in this document to ensure the most current decision logic is applied."

2015/27, paras. 12 – 14: In general, the working group found the wording in Section 2.1.2.2 of the GHS to be confusing and could possibly lead the reader to conclude that assignment of explosives into divisions was based solely on Test Series 2 and 3. This is

not the case, as division assignment is made based upon the whole of the class 1 Test Series and most specifically upon Test Series 6. The working group agreed that the proposals in paras. 12 – 14 of 2015/27 needed further development and that section 2.1.2 should be further reviewed for improvement as part of the overall review of Chapter 2.1 of the GHS. This will include consideration of approaches for explosives when they are not in their packaging or are being disassembled as most of the working group believe that manufacture is outside the scope of the GHS. Members of the working group will work intersessionally to get this review done. The work will be coordinated by the working group chair and members of the GHS will be invited to contribute to this review.

INF.23: Australia had previously volunteered to lead the work relating to review of Chapter 2.1 of the GHS; however, in INF.23, advises that it is no longer in a position to lead this work. This was noted, and no further discussion was undertaken by the working group.

Conclusion: The working group endorsed the amendments in paragraphs 9 and 10 of 2015/27. The working group endorsed the amendment proposed in paragraph 11 of 2015/27 as amended by the working group and described above. See Amendments 1 – 3 in Annex 2.

The working group did not endorse the amendments proposed in paragraphs 12 – 14 of 2015/27 as more work needs to be done. Members of the working group, under the guidance of the working group chairman, will work intersessionally to develop suggested revisions to further improve chapter 2.1 of the GHS. Members of the GHS will be invited to participate in this intersessional work.

Agenda Item 2(i) – Miscellaneous

14. **Subject:** UN3375 ANEs and SP309

Documents: *ST/SG/AC.10/C.3/2015/10 - (AEISG)*

Informal documents: *None*

Discussion: AEISG believes that satisfactory performance in the relevant tests (Test Series 8 (a), (b) and (c)) is considered sufficient basis for proper classification without the additional and unnecessary approval of each substance by the Competent Authority and in 2015/10 proposes removal of that requirement in SP309. Such requirement is seen to be inconsistent with the requirements regarding classification of dangerous goods in classes other than Class 1.

Conclusion: The working group did not concur with the proposal to remove competent authority approval from SP309, as most indicated that this approval was the mechanism by which they maintained oversight of the use of UN3375 for transport of ANEs.

15. **Subject:** Classification by Analogy

Documents: *ST/SG/AC.10/C.3/2015/13 - (SAAMI)*

Informal documents: *None*

Discussion: Classification by analogy is commonly used by Competent Authorities to classify explosives without testing based upon comparison with similar products that have been tested according to the MTC. This practice is not presently acknowledged in the MTC and, in 2015/13,

SAAMI seeks discussion of the concept and help in developing guidelines for classification by analogy.

The working group agreed that there should be some acknowledgement in the Model Regulations of classification of explosives by analogy and that SAAMI had done a good job in preparing 2015/13 as a thought starter on the topic. The working group agreed that some explanatory text should be placed in the introduction of the manual. The Netherlands suggested that rather than a short sentence acknowledging classification by analogy, a paragraph with more details might be helpful. Germany suggested that this could be part of a "guiding principles" document or users guide to the MTC if one were to be developed. Several, including the USA, UK, Sweden, and IME also supported the principle but suggested that it would be best to maintain the details suggested in the annex to 2015/13 as a best practices guide. While supportive of the concept, Canada felt that the information in the annex was too detailed and should be simplified somewhat. SAAMI acknowledged that the annex was detailed but the intent was to point out all the parameters that should be considered as the topic was discussed by the working group and was not intended to be prescriptive. France noted that the concept of classification by analogy is discussed for 1.4S classification in the MTC. Some consideration was given as to whether guidance should be given as an appendix to the MTC or as a standalone document. The opinions of the working group were divided on that consideration.

Conclusion: As 2015/13 was intended to be a thought starter and no specific proposals were offered, no decisions by the working group were required. The working group was supportive of the principle and encouraged SAAMI to consider its comments and to return at the 48th session with additional thoughts for consideration. SAAMI requested that interested parties contact them and identify their willingness to work with SAAMI on development of more for the December session.

16. **Subject:** Transport of water-wet (9 – 25%) PETN

Documents: *None*

Informal documents: *UN/SCETDG/47/INF.8 - (Spain)*

Discussion: Presently, transportation of water-wet PETN under UN0150 where the water content is less than 25% is prohibited unless specifically authorized by the Competent Authority. In INF.8, Spain discusses its experience with safe transportation of water-wet PETN where the water content is less than 25% but more than 9% and proposes to allow transport of water-wet PETN containing at least 9% water under UN0411, which would remove the CA requirement (SP266) that applies to UN0150.

The USA questioned why Spain had selected 9% as a base point for its proposal. Spain replied that it had achieved safe transportation of PETN with only 6% water; however, it selected 9% to be somewhat conservative in its proposal. The USA also questioned whether, if supported by the test data, changes to UN0150 would be more appropriate. Germany expressed concern over the possibility of separation of the water from the PETN and advised that it wants to do some confirmation tests on their own. They also advised that there is variability in the quality of PETN and that 9% water in some might be sufficient but not in others. France questioned on the lack of homogenous distribution of water if the content is reduced to 9%. Canada observed that PETN is a fairly sensitive secondary explosive and that, if using less water to desensitize it, smaller packaging may be needed to minimize the effects of water separation.

Conclusion: The work will continue. As noted, Germany will do some independent tests and share the data with the working group. Spain will consider the working group comments and the additional data provided by Germany as it considers a proposal for the 49th session.

17. **Subject:** Globally harmonized standard for explosives security markings

Documents: *None*

Informal documents: *UN/SCETDG/47/INF.9 - (IME)*

Discussion: The issue of a globally harmonized standard for explosives security markings has been discussed since IME first brought it to the attention of the Sub-committee at the 43rd session. At that time the EWG and the Sub-committee generally agreed that there was a need for such harmonization and asked IME to prepare a proposal. Based on comments it received at the 45th and 46th sessions, IME has decided to delay submission of a formal proposal until the 48th session. INF.9 presents IME's latest effort to devise a proposal that would be acceptable to the Sub-committee and seeks comment on this latest effort before it submits something for the 48th session. In INF.9, IME proposes to add a new recommendation to Chapter 1.4 of the Model Regulations that Competent Authorities consider requiring security markings (as described in a new Appendix C) on packagings containing explosives listed in Table 1.4.1 (the "indicative list") subject to certain exclusions.

Prior to consideration of the proposal in INF.9, IME requested consideration by the EWG of the issue of whether such a proposal is within the mandate of the Sub-committee and should be included in the Model Regulations.

The working group acknowledged that the principle of IME's proposal was valid and that something should be done. Some discussion and suggestions were offered for improving the proposal; however, much of the discussion was devoted to whether such a proposal is within the mandate of the TDG sub-committee and belongs in Chapter 1.4 of the Model Regulations.

Regarding the mandate issue, the UK stated that the security provisions are clearly within the Guiding Principles of the Model Regulations and that they were added as a reaction to the tragic events of 9/11/2001 and it would be a shame to wait until the next such event.

The working group also reviewed the official position of the European Commission, dated 18 June 2015, noting that it does not oppose inclusion of a standard in the Model Regulations, it clearly defines issues with the IME proposal that should be resolved before adoption and offers the services of its staff to assist in development of a formal proposal if invited by the sub-committee to do so. A copy of that statement is included in Annex 3.

After considering the mandate issue at length, the working group unanimously concluded that the proposal by IME was within the mandate of the TDG sub-committee and should appear in some form (whether as proposed by IME in INF.9, some modification of that proposal, or a clarifying note) in Chapter 1.4 of the Model Regulations. The working group suggests that this is within the mandate because:

- It is consistent with the Guiding Principles of the Model Regulations that state that "… it has been determined appropriate to consider transport security as a sub-set of safety provisions."

- It is consistent with the General Principle found in Section 1.4.1.1 of the Model Regulations that states that transportation security is the responsibility of all persons engaged in the transport of dangerous goods.

- It is consistent with the meaning of the term "security" as described in Note 2 of Chapter 1.4.

- Transportation of explosives has been identified as a weak link in the lifetime of explosives because they move about in public without the benefit of the security provided by specialized security storage and the accountability of detailed recordkeeping.

- Use of security marks makes explosives less attractive targets for theft in transportation and a harmonized standard for such marks makes their use more efficient and universally understood.

- No other place to do this has been identified and, given the problem and potential additional tool in solving the problem, a moral obligation exists to do something.

Conclusion: The working group unanimously agreed that the proposal by IME for a globally harmonized explosive security marking standard is within the mandate of the sub-committee and recommends that it be included in the Model Regulations. The working group requests that the sub-committee endorse this recommendation and encourage IME to work with interested parties in developing a formal proposal for consideration by the sub-committee. Further, the working group requests that the sub-committee invite participation by the European Commission in developing the proposal as suggested in point (5) of the position statement provided in Annex 3 of this report.

18. **Subject:** Transport of energetic samples for further testing

Documents: *None*

Informal documents: *UN/SCETDG/47/INF.29 - (CEFIC)*

Discussion: Research and development in industry, public institutes and universities frequently have the need to transport substances for the purpose of testing, i.e. the determination of physical, chemical, biological, toxicological or ecotoxicological properties and behavior, fitness for use or application. These substances are usually intended for use in pharmaceutical or agricultural products and are not intended for use as explosives. Transport of samples of self-reactive substances and organic peroxides is permitted under the provisions of 2.4.2.3.2.4 (b) and 2.5.3.2.5.1, respectively. Substances considered to meet the criteria for Class 1 are prohibited for transport by 2.0.4.2 (b). In many cases, this is a problem because molecules of the substances that carry functional groups listed in tables A6.1 and/or A6.2 in Annex 6 (Screening Procedures) of the UN Manual of Tests and Criteria are indicated as explosive or self-reactive properties; however, they are not designed to be explosives of Class 1. Samples of these materials would be prohibited for transportation under 2.0.4.2(b). In INF.29, CEFIC invites discussion of this issue within the EWG with a desire to develop some suitable solution.

The working group discussed the problem described in INF.29 but could not recommend a specific solution. CEFIC suggested that it should probably define a standardized package to handle these types of samples. This is being examined currently with BAM but the outcome is still pending. So far, it has been impossible to cause initiation of the packaged contents. The amount of samples in the packaging is always below the critical diameter; hence, it is impossible to detonate the contents. BAM would like to perform some tests with detonating substances to

further the investigation; however they are still working out the logistics of such testing. The aim is to come up with a safe packaging specification and an entry in Division 4.1 as a self-reactive substance for these energetic samples.

Conclusion: CEFIC was encouraged to continue the work and to submit a proposal once the testing is done and a proposal could be developed.

19. **Subject:** Transport provisions for UN0501 propellant, solid 1.4C

Documents: *None*

Informal documents: *UN/SCETDG/47/INF.41 - (USA)*

Discussion: Of the fourteen 1.4C entries, only UN0501 (Propellant, solid) is prohibited from transport by cargo air. In INF.41, the USA points out similarities of UN0501 to other 1.4C entries and questions if UN0501 propellants have any fundamental characteristics which differ from the other 1.4C entries.

Conclusion: The working group could find no logical reason why UN0501 is forbidden by air transport and other 1.4C entries are allowed. The working group could identify no significant differences between the risks of UN0501 and the other 1.4C entries. The working group invites ICAO to review the issue further and address it with an appropriate proposal.

20. **Subject:** Classification Procedures Relating to Liquid and Solid Desensitized Explosives Under UN 3379 and UN 3380, and Criteria for Exclusion of Energetic Substances

Documents: *None*

Informal documents: *UN/SCETDG/47/INF.50 - (USA)*

Discussion: Currently, the Model Regulations provide authorization for substances assigned to Class 1 to be excluded based on packaging (see Section 2.1.3.6.2) or by dilution (i.e. desensitized, see Section 2.1.3.6.3), based upon the results of UN Test Series 6. However in both of these cases, no specific criteria or methods are provided to aid the competent authority in making this determination. In INF.50, the USA is asking whether the Model Regulations would benefit from the inclusion of more specific provisions to address the classification of desensitized explosives. If the Sub-Committee is interested in pursuing this work, the USA would be willing to lead an informal correspondence working group to review the issue and develop proposals for consideration at a future session.

Conclusion: There was a lot of support within the working group to make things clearer. Some intersessional correspondence on the topic may ultimately result in some proposals.

Agenda Item 10(g) – Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals: use of the Manual of tests and criteria in the context of the GHS

21. **Subject:** Use of the Manual of Tests and Criteria in the context of the GHS

Documents: *ST/SG/AC.10/C.3/2014/61 - (Secretariat)*

Informal documents: *UN/SCETDG/47/INF.6 - (Netherlands)*
UN/SCETDG/47/INF.21 - (Working Group Chair)
UN/SCETDG/47/INF.31 - (Canada)
UN/SCETDG/46/INF.44 - (Secretariat)
UN/SCETDG/45/INF.8 - (Secretariat) + Add.1 – Add.5

Discussion: At the 46th session the Sub-committee agreed to review the Manual of Tests and Criteria in the context of GHS. INF.6 and INF.31 share extensive comments and suggestions from the Netherlands and Canada. Those comments will be considered by the working group and may serve as the basis for future proposals regarding the use of the MTC in the context of the GHS.

In INF.21, the working group chair advises that this topic will be discussed on 24 June and invites experts regularly attending GHS meetings and wanting to contribute to the discussions in the working group to be present on 24 June for the discussion.

2014/61, INF.44, and INF.8 + Adds. 1 – 5 provide the background information and specific amendments to the MTC to introduce the GHS context.

The working group discussed INF.6 and INF. 31 and provided some comments to the GHS Secretariat in regards to INF.8 of the 45th session.

INF.6:

Para 3 – The working group agreed that the comparison table was the best method for showing the relationship between the transport classification of the Model Regulations and the GHS classifications.

Para. 4 – The working group agreed with this proposal.

Para. 5 – The working group was asked to look at INF.8 (+Adds) to review the issue of substance/mixture and to return with suggestions for simplification and to identify when it would be necessary to use both terms. The working group chairman and SAAMI will do the review for Part I and the introduction and Germany and CEFIC will review Part II. This review should be completed within two months. After this review is completed, France will look at the French version.

Para. 6 – A detailed review will be undertaken in conjunction with the review described above to determine when reference to sectors is appropriate and when such reference is inappropriate.

Para. 7 – To avoid unnecessary duplication and the need to make updates in multiple documents, the majority of the working group concluded that the flowcharts should be removed from the GHS and published only in the MTC. The flowcharts would be replaced with references to the appropriate sections in the MTC.

Para. 8 – The Netherlands will keep these points in mind as the review of the GHS context issue continues.

INF.31:

Para 4 – the Secretariat advised that the MTC was originally developed with only transport in mind. However, the effort now is to determine how to make the manual also apply to the GHS. The working group understands the concern expressed, but they did not support this statement.

Para. 5 – The working group agreed that, if needed in the manual, "supply and use" is the preferred terminology over "consumer".

Para. 6 – The working group supported the proposal in this paragraph.

Para. 7 – This issue was dealt with in INF.6. However, SAAMI pointed out that the use of the term article is inconsistent with their understanding of the term. This should be clarified in the future. The UK requested that an explanation be provided as to why articles are excluded from GHS but explosives articles are not. The Secretariat explained that explosives articles are covered by GHS to maintain consistency with the TDG. After the explanation, UK still preferred that guidance be added in the future. This should be a matter for a separate proposal.

Paras. 8 - 9 – These issues were dealt with in INF.6. Regarding the proposal about section 1.2.1, IME observed that what was proposed by Canada duplicated too much of the detail. It was suggested that a simple statement and a reference to the appropriate section in the Model Regulations would be sufficient. The working group agreed that this was a good solution. The working group also agreed that the revisions suggested by the Secretariat in INF.8 of the 45th session, and its addenda, were preferable in this case over the proposals by Canada.

Para. 10 – The working group preferred the original text from the Secretariat that is contained in INF.8 of the 45th session and its addenda rather than the proposal in para.10.

Para. 11 – The working group preferred not to duplicate text from the Model Regulations into the MTC.

Para. 12 – The working group did not support this proposal.

Paras. 14 & 15 – These issues were dealt with in INF.6

Para. 16 -- The WG agreed that this issue needs to be resolved.

Para. 17 – The WG agreed with this recommendation. Some additional explanation of the figure number protocol was also recommended.

Para. 18 – dealt with in para. 5

Conclusion: The comments discussed above were received by the GHS Secretariat who will take them into account as a new version of the proposals originally published in INF.8 of the 45th session and its addenda is prepared using the 6th revision of the MTC as its base document.

Annex 1
Working Group on Explosives (22 – 25 June 2015)
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Annex 2
Working Group on Explosives (22 – 25 June 2015)
Changes for the GHS Document (6th Revised Edition)

Note: Source of proposed change is indicated by *italicized text (Source: XXX)*

Amendment 1.

Section 1.3.2.2.1 – add a new sentence as indicated below:

1.3.2.2.1 The GHS uses the term "hazard classification" to indicate that only the intrinsic hazardous properties of substances or mixtures are considered. In special cases, such as for explosives, alternative classification principles may apply.

Source: ST/SG/AC.10/C.3/2015/27, para. 9 and UN/SCETDG/47/INF.53, para. 13

Amendment 2.

Section 2.1.4 – amend as indicated below:

The decision logic and guidance~~, which follow, are not part of the harmonized classification system, but have been provided here as additional guidance~~ in the *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria* apply. It is strongly recommended that the person responsible for classification studies the criteria before and during use of the decision logic.

Source: ST/SG/AC.10/C.3/2015/27, para. 10 and UN/SCETDG/47/INF.53, para. 13

Amendment 3.

Section 2.1.4.1 – insert a new paragraph as indicated below and delete figures 2.1.1, 2.1.2 and 2.1.3.

The classification of substances, mixtures and articles in the class of explosives and further allocation to a division is a very complex, three step procedure. Reference to Part I *of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria,* is necessary. The first step is to ascertain whether the substance or mixture has explosive effects (Test Series 1). The second step is the acceptance procedure (Test Series 2 to 4) and the third step is the assignment to a hazard division (Test Series 5 to 7). The assessment whether a candidate for "ammonium nitrate emulsion or suspension or gel, intermediate for blasting explosives (ANE)" is insensitive enough for inclusion as an oxidizing liquid (Chapter 2.13) or an oxidizing solid (Chapter 2.14) is answered by Test Series 8 tests. ~~The classification procedure is according to the following decision logics (see Figures 2.1.1 to 2.1.4).~~

The current decision logic for the classification of explosive substances, mixtures and articles as prescribed above are located in Sections 10.3 and 10.4 of the *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*. They are not provided in this document to ensure the most current decision logic is applied.

Source: ST/SG/AC.10/C.3/2015/27, para. 11 and UN/SCETDG/47/INF.53, para. 13

Annex 3
Working Group on Explosives (22 – 25 June 2015)
Position Statement of the European Commission in reference to IME proposal UNSCETDG/47/INF.9

The document is reproduced on the following page

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR MOBILITY AND TRANSPORT

Directorate C - Innovative & sustainable mobility
C.4 - Road safety

Brussels, 18 June 2015
MOVE/C4/RF

NOTE FOR EU MEMBER STATE REPRESENTATIVES IN THE SUB-COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Subject: UN/SECTDG/47/INF.9 – Position of the European Commission

The Commission services in charge of the transport of dangerous goods and of the implementation of Directive 2008/43/EC setting up a system for the identification and traceability of civil explosives (hereinafter the 'Explosives Traceability Directive') have studied the suggestion of IME in the abovementioned document, and would like to make the following comments:

(1) IME's proposed new Appendix C contains provisions which are similar but not identical to the provisions of the Explosives Traceability Directive.

(2) For instance, pursuant to provision C1-3.1 in Part 1 of Appendix C in IME's draft proposal, the alphanumeric code shall contain the country code of the manufacturing country, whereas point 1(b)(1) of the Annex to the Explosives Traceability Directive requires the alphanumeric code to contain the country code of the Member State of import into the EU. Furthermore, pursuant to provision C1-3.2, the electronic readable information must be part of the unique identification only "when required by the competent authority or if desired by the manufacturer". However, under the Explosives Traceability Directive, this element is always required.

(3) Also the guidance contained in Part 2 of Appendix C in IME's draft proposal contains inconsistencies with the Explosives Traceability Directive. One example is provision C2-2(b) of the draft text, which allows the required information to be provided on the "packaging or in a document accompanying the explosive", whereas point 3 of the Annex to the Explosives Traceability Directive requires information to be affixed to each smallest packaging unit, which shall be closed with a seal.

(4) EU Member States and other Parties should be aware that, even if the proposed new Appendix C were to be adopted, explosives placed on the EU market would still have to comply with the Explosives Traceability Directive. This could imply that explosives imported into the EU would be subject to double labelling.

(5) To prevent such a situation, the Commission staff would be willing – if invited by the Sub-Committee – to assist with the drafting of the new Appendix C, so as to make it consistent with the Explosives Traceability Directive.

Roberto FERRAVANTE

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