UN Informal Working Group on Lithium Batteries – 2023-2024

6-8 December 2023 – Geneva, Switzerland

Introduction

1. Claude Pfauvadel (France, Chairman) and Claude Chanson (RECHARGE) welcomed participants to the UN Informal Working Group on Lithium Batteries (IWG). The intent of the meeting was to review the current status of the hazard-based classification system for lithium batteries.
2. Agenda meeting:
    i. Report of the group progress (feedback of the last meeting April 2023 Seoul, report of the progress of the testing labs plan; UN Subcommittee July 2023 Mandate).
    ii. Introduction of the general document " draft -based classification".
    iii. Update of the last labs tests plan. Introduction of new Labs tests.
    iv. Detailed review of the general document " draft hazard based classification."
    v. Further development of the general document " draft hazard-based classification".
        1. Discussions for the packaging conditions according to the categories
3. Information and presentations given at the meeting will be available from RECHARGE after the meeting. Presentations and historical documents including minutes from previous meetings (2016-2021) are available from the RECHARGE Website https://rechargebatteries.org/sustainable-batteries/unsctdg/. (will be completed in Jan 24)

Review of previous work

4. The group reviewed the updated mandate from the UN Subcommittee that was adopted in July 2023. The mandate includes developing draft text for inclusion in the Model Regulations, considering the impact of packaging and state of charge. A drafting group began work on the text and it will be reviewed during this session.
5. In addition, laboratories continued to review test methods and conduct tests using these methods.
6. Since July 2023, a drafting group developed text to introduce into the Model Regulations and the Manual of Tests and Criteria. The basis of the text addresses an additional test and procedure that will identify whether a cell propagates and what hazards may result. Based on the results, a cell would be included in one of several categories (A-H). The categories can then be used to consider additional packaging requirements, exceptions, etc.
7. The group has generally agreed in previous sessions that batteries constructed of cells would be assigned the same category as cells when tested fully charged. However, it was recognized that if a different category is desired, the battery would need to be tested as well.

Update of the last labs tests plan. Introduction of new Labs tests

8. RECHARGE provided an update on the report from test labs.
    a) The group concluded that the test protocol could be applied to all cell designs (cylindrical, prismatic, pouch) with positive results.
    b) However, there are times where reproducibility may be a challenge based on acute conditions with the battery or the test conditions. In these cases, the lab would need to consider whether the actual test remained within testing parameters. The group felt additional advice would need to be developed to explain when a test method was valid, or it needs to be run again.
    c) The test lab group also discussed experience in testing batteries. If some cells in the battery propagate but not all cells propagate, would this be considered a pass or fail? If the casing cracks, would that be considered a failure? There needed to be additional guidance on how to interpret test results for batteries. While it may be valuable in some cases to consider a battery casing as packaging, how would one deal with batteries that are designed to be placed directly into equipment without casing? These questions will need to be resolved by the IWG.
    d) Reproducibility was emphasized. Therefore, the group recognized the need to be as detailed as possible in the test protocol so that all labs conducting the test will get the same results if testing on the same cell/battery.
    e) The test protocol requires detection of flammable gas generation as a possible indicator of explosion risk. Yet it is not clear how laboratories are to determine gas concentration. There are several ISO standards that may be applicable. But one should be identified. Further, it is recognized that combustibility may be impacted by combustible materials that are not part of the cells (casing, wires, etc.). Fulcrum indicated they have a presentation to share during this session on a possible method for measuring the flammable gas generation.
    f) There are 7 laboratories currently involved in the draft testing methods.
    g) The IWG group discussed the fact that when cells in a battery are connected in parallel, the energy of all the connected cells would feed energy to a cell where a short circuit occurs. That would likely create an extreme situation at that particular cell. But the test would also measure any safety or mitigation systems to prevent propagation. This condition may not be experienced in batteries where cells are in connected in series.
    h) RECHARGE also shared a spreadsheet of various summaries of results and conclusions from the lab testing group.
    i) IWG shared additional proposals addressing the test methodology
        i. An alternate heating method was described using a copper element customized for the diameter of the cell and attached to a heating rod to generate the heat. BAM found the system useful and reproducible. However, the group discussed whether the test protocol needs to be very specific or whether the criteria should be defined and let the testing labs use tools available that meet the criteria. It was noted that copper elements may not survive for high temperatures in some EV cells. Therefore it was suggested that heat transfer criteria may be better than referring to heating rate, etc. Yet, at the same time, it was recognized that the heating rate may still determine the amount of flammable gas

generated (i.e. slower rate may result in larger volume of gas exhausting the cell before getting in the thermal runaway).

ii. Placement of the thermocouple should be relatively close to the heating element on the cell, recognizing the design and size of the cell may dictate modification. Some cautioned that cell design may counter the heating process. The IWG agreed that the heating process should be clearly defined so that reproducibility in labs will be high.

9. CATL presented on the current version of the testing protocol. The protocols break down to thermal propagation and gas volume determination. They visually demonstrated a table detailing the 9 different categories and relevant hazard criteria. They identified several issues:
    a) Cell propagation test – gap between cells – they noted the gap between shipping cells relies on packing condition of the supplier and not all cells will be next to each other in transport. Larger gaps greatly reduce the likelihood of thermal propagation. They proposed to define the gap as how the cells will be offered for transport. The Chairman noted the initial testing should not have any gap. But recategorization might be possible with additional tests using gaps.
    b) Test SOC vs. Transport SOC – They noted that cells are not always shipped at 100% SOC. Lower SOC reduces hazard effects during testing. They recommended cells be tested at typical transport SOC.. If the cells were only tested at 40% SOC, then the cells are only able to be transported at 40% SOC. That concept needs to be further developed.
    c) Heater parameter – Heater used did not trigger large prismatic cells into thermal runaway before the heater failed. They used trial and error to find a heater that worked. CATL recommended following the ISO 6469-1 AMD standard for cell initiation. This standard details 3 methods for cell initiation: nail penetration (short circuit), internal heating, and external heating. Any of these methods would be useful as they will result in cell initiation. CATL commented that the current method for external heating produces too much heat and may result in accidental damage to the cell or the heating element itself. The IWG discussed that nail penetration is not reproducible uniformly across all laboratories. Thus, the test method must be limited to external heating fro cell. Further, the heating rate is critical as it has been confirmed that different rates lead to different results. It is the labs responsibility to identify suitable heaters, and suitable knowledge can be shared. However, for batteries, it may be possible to reference the ISO standard.
        i. Cell gas volume determination - They also noted that volume will vary based on the capacity of the cells.
10. The IWG explained that the purpose of the propagation test is to determine the worst case, intrinsic hazards associated with the cell. This is measured, based on the assumptions of the IWG, by testing at 100% SOC and tested with no gap and heated at a set rate. Once the cell is categorized, the concept can be applied to batteries made from categorized cells. Cells could be tested at a reduced state of charge, But that would then mean the cell/battery would not be capable of being transported at a higher SOC.
11. The FAA shared their test results from the existing protocol.
    a) They used 6 cells instead of 4, and heated the initiation cell at 20 ^{o}C/min

b) Most pouch and cylindrical cells propagated. However, small cylindrical and Lithium iron phosphate (LFP) cells did not always propagate.
c) They concluded that for most cell types, increase in cell energy capacity resulted in faster propagation speed.
d) The also observed a linear trend of gas generation with a higher capacity cells generating more gas, although cell chemistry impacted generated gas volume.
e) Based on their results, they suggested a simplified approach resulting in 4 categories. Instead of beginning with propagation, their flowchart starts with whether a fire results, then whether the cells propagate. The benefit of the system is that gas volume only applies for tests where fire results. They proposed 3 volumes of gas as a distinguishing point between categories 2, 3, and 4.
f) The group questioned whether the propagation rate is necessary to consider/measure. Cells that propagate slowly or fast both propagate. But others felt that the propagation rate may be important in an emergency response situation. Default values could be used, but that might not provide enough details for transportation situations. But it was also mentioned that the measured propagation rates were also much slower than the criteria (1000 mm/min) used for the propagation of flammable solids.
g) Some questioned whether the equipment to measure gas volumes were available at all laboratories. The group commented that temperature and pressure can be used to calculate gas volume production. For batteries, the gas volume can be calculated by measuring the amount of gas produced in a cell, and then multiplied by the number of cells in the battery. Alternately, the volume of gas can be calculated by testing the entire battery. It was suggested that a table could be developed to identify gas volumes based on battery chemistry. However, others were opposed noting new battery technologies would constantly be introduced and the table would need to be continually updated
h) Gas production rate is not currently included in the draft text. But if certain modes would require the gas rate to ensure safety, then a gas production rate could be considered.
i) It was also discussed that the FAA testing included a spark igniter to determine if the gas generated is flammable. They reported that in all cases where propagation occurred, the gas burned. In the simplified flow chart, whether fire occurs through the event is not relevant. However, if the full proposed flow chart is used, the data would not allow for distinguishing between some of the categories.

12. Fulcrum Testing presented a testing set up whereby the heat flux could be measured using a copper plate placed over the top of the test cells along with a screen to prevent solids from leaving the apparatus. The temperature of the copper plate could be measured to determine the heat produced in the test. The group was interested in the approach and encouraged the concept be discussed by the laboratory testing group.
13. To summarize the discussion, the group concluded that propagation rate may not be critical, but it may be beneficial to provide “ranges” to ensure the test is being conducted correctly.
14. The FAA also shared testing of batteries. They tested commercially available battery packs and initiated a cell within. The videos showed that the battery packs burned completely, including melting the casing and wiring into a “big blob”. Thus, the test methodology was

shown that it works for batteries as well. It was worth nothing that for batteries, propagation time was significantly longer, in some cases longer than 1 hr.

15. INERIS shared similar testing of very large LFP cells but did not see cell propagation. They also confirmed the protocol can be applied to batteries.
16. BAM shared testing on sodium ion batteries. They have conducted more than 200 tests and thus have great experience with the designs and chemistry. The initial temperature data suggested no thermal runaway. However, when reviewing video and post-test materials, the core was ejected and damaged the equipment. They reran the tests at lower than 100% SOC. They continued to see core ejection but in these cases heat increases were observed.
    a) The group needs to review how to address propagation when core ejection occurs. Core ejection may be identified as a failure, but it may result in a safer battery as it reduces the probability of propagation.
    b) BAM concluded that the test protocol will work with sodium ion batteries, but there may need to be additional discussions on how to manage the measuring the results.

Introduction of the general document " draft-based classification"

17. A drafting committee met after the April 2023 IWG meeting to develop text that could be incorporated into the Model Regulations. The "draft" was reviewed by the IWG although it was acknowledged there are several areas where gaps must be filled. The goal of the group is to submit a formal proposal to the Subcommittee before 29 March 2024 (deadline for formal proposals). The Chairman explained that the IWG needed to agree to the framework between now and the end of March 2024, but that additional details may be identified after the formal paper is submitted. The intent is to have the Subcommittee review the overall concept and direction of the text.
18. The draft text for the Model Regulations and the Manual of Tests and Criteria includes the following elements:
    a) The categories were identified as "divisions" because the term already exists in other parts of the Model Regulations. The divisions were identified A-H and X. Division X represents a cell or battery that has not been tested under the new protocol. Divisions A-H represent reducing level of risk. **NOTE:** the flowchart has a different listing of divisions but that will be changed prior to submitting to the Subcommittee.
    b) The new paragraph 2.9.4.2 explains the new categorization and assignment of division. It also notes that if the cell or battery is not tested under the new protocol, it would be assigned to Division X.
    c) 2.9.4.3 explains that there are situations where the original division assignment may be modified by additional testing (considering installation of cells in a battery, packaging, state of charge, etc.)
    d) The DG List would be updated including new entries for the batteries with assigned divisions (approximately 30+ entries).
    e) Existing special provisions were modified (including the deletion of SP230).
    f) Part 4 remains to be developed.
    g) Chapter 5.2 would include consequential changes to address the label that would need to be applied. The existing 9A label would be modified to include the lithium battery division. It may be possible to reduce the number of divisions based on

transport conditions. However, at a later date, if the group decided to separate the divisions, it may be more difficult.

h) A new paragraph in 5.4.1.5.1.4 would require the SOC to be included when batteries are shipped under 2.9.4.3.

i) In the UN Manual, new tests are introduced in 38.3 (Test T.9 for cell propagation, Test T.10 for cell gas volume generation, Test T.11 for battery propagation, Test T.12 for battery gas volume generation, Test T.13 for cell gas flammability) along with introduction information and consequential amendments throughout the section. The tests were included but simplified to align with existing test descriptions.

End of Day 1

Day 2

Discussion of the "draft-based classification"

19. After reviewing the draft text on Day 1, the IWG discussed each section of the text in detail. The Secretariat reminded the group that that intent is to submit a formal document to the 64th UN TDG Session in June 2024. The document must be submitted by 29 March 2024, but may be supplemented with additional details in informal papers submitted after March 2024.

    a) **UN Model Regulations, Section 2.9.2**

        i. This section would be updated to list the relevant UN numbers assigned for lithium batteries under the new classification system. Chapter 2.9 currently includes a listing of all UN numbers assigned to Class 9. Therefore this is consistent with existing practices.

    b) **Section 2.9.4**

        i. The section is about classification. It includes reference to testing under UN38.3 to explain that to be considered a Class 9 material, you must test in accordance with UN38.3. The section was updated to include the additional tests under 2.9.4.2.

        ii. The section was divided into two subparagraphs, .1 and .2. 2.9.4.1 would contain the language for passing UN38.3. Paragraph (a) was revised to eliminate redundant text. However, there were questions as to whether the text authorizing older batteries to continue to be transported was clear and still necessary. The paragraph was placed in square brackets for additional confirmation that these batteries still exist in transport. It was agreed the changes to paragraph (a) will be proposed to the Subcommittee in a separate proposal.

        iii. 2.9.4.2 addresses the new classification system for reclassification of batteries to separate divisions. The group discussed whether damaged/defective batteries should be included in 2.9.4.2. Cells and batteries not tested under T.9-T.12 would be assigned to Division 9X and would then fall under the relevant packing instructions and special provisions. After significant discussion, the group could not find consensus on the final text in relation to how to apply the classification for

prototypes and damaged/defective batteries. It is possible in a general way to include the text under 2.9.4.2. But it may also be appropriate to assign special provisions 376/377 to all entries.

iv. The table in 2.9.4.2 contains a description of each of the categories. 9X was initially assigned to worst case batteries and those untested. But after discussion, it was suggested to separate 9X and assign only to cells and batteries that have not been tested under T.9-T.12 and would also be used for damage and defective cells. Category 9A would represent the worst-case scenario of a battery that may propagate, propagate rapidly, and produces heat or fire,. All other entries were re-assigned a subsequent category (existing 9A became 9B, existing 9B became 9C, etc.). The descriptions were simplified to align with similar text from the Explosive division descriptions. (e.g. cells or batteries that have a thermal event propagation hazard and fire hazard).

v. It was suggested that the new tests might be easier to explain if they were contained in a separate Section of the UN Manual (i.e. 38.5). The group concluded that could be something considered in the future and perhaps submit to the Subcommittee for consideration.

vi. The group acknowledged the system will increase complexity of classifying lithium batteries. But the intent is to provide this system to prove that any given cell or battery design is safer than other battery designs because the tested cell/battery does not propagate, etc.

vii. 2.9.4.3 provides additional provisions for testing the batteries categorized under 2.9.4.2 at a reduced state of charge (SOC) provided the consignor can demonstrate the battery is not being offered at a SOC greater than the SOC tested, the transport document identifies the state of charge, and the test summary includes conditions related to the categorization. The group discussed various text revisions, but the final language will be developed by a smaller drafting group. This paragraph also requires inclusion of the tested SOC on the lithium battery test summary when required by 2.9.4.3.

c) **Section 2.9.5**

i. The IWG agreed to not extend new tests to sodium ion batteries for the moment. But it is intended to develop text for these battery types in the future. Thus, the addition of 2.9.4.1 points to the requirement to apply the UN38.3 tests T.1-T.8 as applicable.

d) **Chapter 3.2**

i. The IWG discussed the modifications and new editions to the DG list. The existing entries (UN3480, UN3481, UN3090, UN3091) were assigned Division 9X.

ii. SP376 (damaged/defective) and SP377 (disposal/recycling) were assigned to all entries. SP310 (prototype/low production runs) were assigned only to existing entries because prototype and low production runs are not tested to the new protocol, and thus it would be impossible to assign them to one of the new categories.

iii. SP188 was updated to reflect the new paragraph reference to 2.9.4.1, UN38.3 Tests T.1-T.8.

iv. SP230 was considered redundant and thus proposed to delete.

v. SP328 discusses when lithium or sodium batteries are contained in a fuel cell system. The new entries were added to the provision.

vi. SP376 addresses damaged/defective batteries. No changes were deemed necessary.

vii. SP377 deals with disposal and recycling. The group discussed that disposal/recycling programs will consolidate many different categories of cells and batteries. As a consequence, a new sentence was added to the special provision to clarify that batteries moving under this special provision shall be shipped under UN3090, UN3091, UN3480, or UN3481. The group had significant discussion about whether batteries may be shipped under the new entries and still be shipped under P909. Text was included in square brackets to clarify that if the conditions of 2.9.4 and 2.9.5 are still confirmed, the batteries may be shipped under the applicable UN40XX entry and packed in accordance with the relevant packing instruction for that entry.

viii. SP384 references the use of the 9A label. Pending the discussion on hazard communication, the SP was updated to include the possible new labels depicting the Division number.

ix. SP387 and SP388 were updated to include the new UN numbers and entries.

x. SP389 was updated only to reflect the addition of 2.9.4.1.

xi. SP390 was updated to include the new entries.

e) **Chapter 4.1**

i. The packing provisions remain to be developed.

f) **Chapter 5.2**

i. The IWG was divided as to whether the Class 9A label should be revised to include the Division letter (X, A-H). Some believed the addition of the division letter would improve loading and handling as well as emergency response. Others felt creating additional labels will significantly complicate the implementation and practical use of the regulations. The group agreed to include the proposed language in square brackets. Further, participants suggested the following questions be posed to the Subcommittee:

1. Is the hazard communication based on UN numbers sufficient?
2. Or would it be better to communicate the division on the labels.

ii. The WG Felt the answer may be different for different modes. The proposal to the Subcommittee will request the representatives in the Subcommittee consult with their modal agencies as to the best approach.

g) **Chapter 5.4**

i. The draft includes adding a new 5.4.1.5.14 that the maximum SOC must be included on the shipping paper when 2.9.4.3 is applied.

20. The working group also reviewed draft amendments to UN38.3 to incorporate the new testing provisions, but limited comments to editorial amendments.

a) Under 38.3.2.2, the group discussed how to address the difference in design types that will lead to a result of the tests defined in 38.3.5 and UN38.3.6. It was agreed that a new sentence would be added and references to 38.3.4 would be added to paragraph (c).
b) The flowchart in the draft was noted to have the reverse assignment of categories. The highest hazard would be represented by A and will have a descending hazard to H or I. The flow chart may be adapted depending on the decision of the Subcommittee. Additional discussion on the flow chart was also considered on Day 3.
c) To address cells/batteries that do not enter a thermal runaway or were not able to be qualified under the new classification tests, the IWG could consider certain conditions where the cells/batteries could be excluded from the provisions at a future meeting. This would include solid-state batteries and other new battery technologies. There are known cases, including solid state batteries, where a thermal runaway cannot be initiated. The IWG will review ways to address these situations. For batteries where the cells cannot be initiated, the Subcommittee will need to be requested to comment on how to address.

End of Day 2

Day 3

Review of Flow Chart

21. The IWG reviewed a visual representation of the T.9 cell propagation test from MDTC to enable closer review of the testing system. The system highlighted that there are some additional areas where the current flow chart has gaps. The chart would need to be updated based on additional decisions and discussions, and to reflect the appropriate tests and hazard classification categories.
22. The group discussed whether propagation time was relevant. Some felt the propagation time could be eliminated, arguing that it does not have an impact on safety.
23. Others commented that the group has two responsibilities: 1) determine hazard classification and 2) identify transport conditions.
24. Theyfelt the group should not reduce the number of categories just to simplify the system. The Chairman reminded the group that the proposal needs to be presented to the Subcommittee and it will be easier to remove entries in the future than to add new entries.

Review of Tests T.9-T.13

25. The group agreed to refer the specific text to the lab testing group to address additional changes. It was noted that the discussion on SOC from this session needs to be considered when updating the test text to permit a cell/battery to be tested under 2.9.4.3 at a reduced state of charge without testing at 100% first.
26. There was also a question regarding T.9 and where the temperature needs to be measured. It is unclear where the temperature needs to be measured (initiation cell, witness cell, etc.). This will need to be clarified in the final text.

27. The group also discussed whether gas measurement needs to be further specified. It was noted that the draft T.9-T.13 are already more detailed than the existing T.8. Difficulties in other working groups in developing very detailed testing protocols led to limited progress. The group agreed that the tests need to provide enough details to conduct the test, but provide flexibility for laboratories to determine the best way to measure and interpret the results. Too much detail may impede adoption by the Subcommittee.
28. It was mentioned that the maximum temperature of 150 °C was based on the fact that paper and other combustible materials have an ignition temperature of 200 °C or above. Inner packaging material such as plastics have a lower combustion point, and these figures might need to be rechecked. The group will continue to review this temperature based on experience in related testing for combustible packaging materials.
29. Some participants explained that for lithium metal cells, the test methodology as presented will result in a melting of the components, not a thermal runaway. The gas, heat, and fire produced then is not from a thermal event that would occur in transport, but from a complete destruction of the battery. They argued this is too severe. The Chairman explained that if a cell does not enter into thermal runaway, the Subcommittee will need to define how to address. He drew attention to the Japan paper from the 63rd Session of the Subcommittee regarding solid state lithium ion batteries. For these types of batteries, a new solution needs to be found. The Chairman noted the provisions being discussed are optional. The cells/batteries may be transported by the current system. Or an alternate approach can be presented for these types of cells. But for this session, the group may not be able to address all issues raised.

Packing Instructions

30. The IWG discussed appropriate packaging methods for the categories identified. It was recognized that the UN Model Regulations may have combined packing instructions for some of the divisions, but modal regulations may need to have additional limitations or packing requirements. It was understood that the provisions are intended to provide exceptions to packaging requirements based on intrinsic hazards. The assumption is that the existing provisions will remain in place for a certain period of time (or indefinitely) and allow movement of cells and batteries under the current requirements.
31. The packing provisions of SP188 and P003 were used as a starting point for a baseline packing instruction.
32. The group noted that once the simplified packing instructions were developed, assignment of SP188 may need to be reviewed as it currently is cell/battery nominal energy and quantities of cells/batteries. Once the new packing conditions have been identified, it may be that SP188 may be irrelevant in the new system. However, the group agreed that experience needs to be gained using the new system before making major changes to existing provisions. Thus, this effort will be taken in the future.
33. Some participants pointed out the new system may disadvantage existing technologies that have proven safe in transport, and they preferred to incorporate packaging solutions in the work of the group. The Chairman explained that convincing the Subcommittee to assign packaging to the IWG mandate has been very difficult. The original mandate included only classification testing on intrinsic hazards. It has now been expanded to include text to be considered by the Subcommittee including packing provisions.

34. The group applied the following logic to the developing the packing instructions:
    a) All instructions must include general requirements of protecting the cells or batteries individually, separating the cells/batteries to prevent contact between the cells/batteries, and cushioning to prevent damage.
    b) P003 was used as starting text. It was agreed that 4.1.1.4 (applies to liquids) and 6.1.4 were not required. The sentence related to "equipment" was placed in brackets to allow for additional time to determine if it is necessary. The draft language was compared to P903 and provisions for unpackaged articles on pallets or other handling devices were authorized provided the cell or battery has a strong, impact resistant, outer casing.
    c) Particular packing provisions were also added to the basic instruction as placeholders as the packing provisions are developed:
        i. PPx For UN 40YY batteries shall be protected from short circuit within the batteries. This is a general principle that would be applied to all new entries for batteries.
        ii. PPx+1 Will address high temperatures experienced when cells or batteries react. The packaging outer casing shall be capable of withstanding temperatures exceeding 150 °C. (a link between the specific protection level and tested battery will be included). This will be applied to categories that generate high temperatures.
        iii. PPx+2 This provision would address gas production. Need general provisions about the quantity of gas related to the cells and battery size.
        iv. Additional PP provisions may need to be included to address flame and propagation hazards.
35. The IWG agreed to schedule a small group to further develop the packing instructions based on the principles discussed during the session. These principles can be presented in further proposals to the Subcommittee at the 64th Session in June 2024.

Questions that Remain from the Meeting

36. Topics that were not finalized:
    a) Final details on Testing requirement text for the UN Manual of Test and Criteria
    b) Draft packing instructions for new entries

Conclusions and Next Steps (Action Plan)

37. With the departure of Claude Pfauvadel (France), Remko Dardenne (Belgium) volunteered to serve as the Chairman for future meetings. The significant contributions Mr. Pfauvadel were recognized by all in attendance.
38. Working groups will be scheduled through 2024 to address outstanding text.
    a) January 2024 the lab testing group will convene to further edit the testing.
    b) In January or February 2024 a group to draft packing instructions will be scheduled.
39. The IWG may schedule a virtual session before the June 2024 Subcommittee Meeting, and an in-person meeting after July 2024 to prepare a final proposal and discuss further work for the November-December 2024 Subcommittee Meeting.

40. A possible timeline for future working session dates will be circulated with the drafted text and the minutes of this session.

End of Day 3