



DANGEROUS GOODS PANEL (DGP) MEETING OF THE WORKING GROUP OF THE WHOLE

Rio de Janeiro, Brazil, 20 to 24 October 2014

REPORT OF THE MEETING OF THE WORKING GROUP OF THE WHOLE

1. INTRODUCTION

1.1 The meeting of the Dangerous Goods Panel Working Group of the Whole (DGP-WG/14) was opened by Mr. B. Carrara on behalf of the Agência Nacional de Aviação Civil (ANAC) on 20 October 2014. Ms. M. Paquette was elected Chairperson of the meeting and Mr. B. Firkins was elected Vice-Chairperson. Ms. Paquette, on behalf of the working group, thanked ANAC for hosting the meeting.

2. ATTENDANCE

2.1 The meeting was attended by the following panel members, advisers and observers:

| Members | Advisers/Observers | State/International Organization |
|-------------|---|----------------------------------|
| | M. Böhm | Austria |
| B. Firkins | | Australia |
| | F. Carroll | Bahamas |
| B. Carrara | N. Bruno R. Crucello Passos L. De Castilhos Peixoto C. K. de Freitas S. S. Dias H. dos Reis C. J. Leão e Silva P.H. Leite Paludo P.F. Macário L. Rodrigues Cascardo H.C Rodrigues Petkovic A. Scheffer | Brazil |
| M. Paquette | | Canada |
| | H.F. Rueda | Chile |

| Members | Advisers/Observers | State/International Organization |
|----------------|---|--|
| Q. Xu | C. Chan (Hong Kong SAR) Y. Li G. Liu H. Wang S. Mok (Hong Kong SAR) | China |
| P. Tatin | J.-M. Dauphant | France |
| | G. Closhen B.-U. Wienecke | Germany |
| M. Gelsomino | C. Carboni | Italy |
| H. Sugimoto | N. Iki F. Tanigawa S. Yabe K. Yanagawa | Japan |
| T. Muller | R. Dardenne D. Kampman H. van der Maat K. Vermeersch | the Netherlands |
| | D. Kurdchenko | Russian Federation |
| | N.W. Mathonsi | South Africa |
| | S. Garcia Wolfrum | Spain |
| | N. Hagmann R. Joss | Switzerland |
| | K. Al Balooshi P. Balasubramanian A. Wagih | United Arab Emirates |
| R. McLachlan | J. Hart | United Kingdom |
| C. Glasow | V. Babich M. Givens R. Hill S. Kelley J. McLaughlin | United States |
| | L. Graña M.C. Lorenzo | Uruguay |
| D. Brennan | P. Oppenheimer B. Sullivan | International Air Transport Association (IATA) |
| | S. Whittingham | International Atomic Energy Agency (IAEA) |
| | D. Ferguson P. Rohrbach | International Coordinating Council of Aerospace Industries Associations |
| M. Rogers | S. Schwartz | International Federation of Air Line Pilots' Associations (IFALPA) |

| Members | Advisers/Observers | State/International Organization |
|---------|-------------------------------|--|
| | K. Rooney L. McGuigan | International Civil Aviation Organization (ICAO) |
| | E. Sigrist | European Chemical Industry Council (CEFIC) |
| | G. Leach | Dangerous Goods Advisory Council (DGAC) |
| | B. McClelland A. McCulloch | Global Express Association (GEA) |
| | G. Kerchner R. Jostes | The Rechargeable Battery Association (PRBA) |
| | B. Bonnardel-Azzarelli | World Nuclear Transport Institute |

3. REVIEW OF THE REPORT

3.1 Agenda Item 1: Development of proposals, if necessary, for amendments to Annex 18 — The Safe Transport of Dangerous Goods by Air

3.1.1 Provide more Prominence to “Reporting” Dangerous Goods Accidents and Incidents (DGP-WG/14-WP/29)

3.1.2 It was noted that although Annex 18 required States to establish procedures to *investigate* dangerous goods accidents and incidents, States were not required to establish procedures to *report* dangerous goods accidents and incidents. Recognizing that reporting was an essential function which provided the initial source of information for investigations, an amendment to Annex 18 was proposed which would require States to also establish procedures for accident and incident reporting. Three options for amendment were provided:

- a) Option 1 proposed the addition of two new paragraphs in Chapter 12 which included the new requirement along with the detailed reporting provisions for accidents and incidents and for undeclared or misdeclared dangerous goods discovered in cargo.
- b) Option 2 included the same new paragraphs proposed in Option 1 and separated dangerous goods accident and incident reporting from dangerous goods accident and incident investigating by introducing a new Chapter 13 for the latter.
- c) Option 3 restructured current paragraphs 12.1, 12.2, 12.3 and 12.4 by breaking the establishment of procedures for investigating and compiling information into a list and adding reporting to that list.

3.1.3 The working group expressed its appreciation for the extensive work in developing the proposal. It was recognized that there were several gaps with respect to reporting that needed to be

addressed and that a comprehensive proposal to address these gaps should be developed in conjunction with work already completed on this proposal. These included:

- a) Currently only the operator was required to report. A recommendation for entities other than operators to follow the reporting requirements of the Technical Instructions, when in the possession of dangerous goods at the time a dangerous goods accident or incident occurred or when dangerous goods were discovered to have been undeclared or misdeclared, was added to Part 1;7 of the 2013-2014 Edition of the Instructions. Whether or not to mandate this reporting requirement should be considered.
- b) Clearly defining which entities should/must report, who they should report to (e.g. the operator or the appropriate national authority of the State in which the occurrence was discovered) and the scope of their reporting requirements needed to be addressed.
- c) Setting a time frame in which reporting was required should be considered.
- d) The feasibility of requiring reports of non-compliance discovered outside the transport chain should be considered, noting that a report of misdeclared lithium batteries discovered after they had exited the transport chain was raised under discussions of Agenda Item 6.1 (see paragraph 3.6.1 of this report).
- e) Whether or not States should be required to report to ICAO needed to be discussed. It was recognized that some form of reporting would be necessary for the purpose of populating the dangerous goods and accident and incident reporting system. The type and frequency of reports from States would need to be determined.
- f) Ensuring that only necessary information was reported would need to be considered.

It was agreed to continue work on reporting over the biennium and to do so in coordination with the work on developing a dangerous goods incident and accident information system discussed under Agenda Item 6.1 (see paragraph 3.6.1 of this report).

3.2 Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2017-2018 Edition

3.2.1 Agenda Item 2.1: Part 1 — General

3.2.1.1 Transition Period (DGP-WG/14-WP/6)

3.2.1.1.1 The report on discussions on this working paper is provided under Agenda Item 6.4 (see paragraph 3.6.4 of this report).

3.2.2 Agenda Item 2.2: Part 2 — Classification of Dangerous Goods

3.2.2.1 No working papers were presented under this agenda item.

3.2.3 **Agenda Item 2.3: Part 3 — Dangerous Goods List, Special Provisions and Limited and Excepted Quantities**

3.2.3.1 **Requirements for the Transport of Environmentally Hazardous Substances (UN 3077 and UN 3082) (DGP-WG/14-WP/18)**

3.2.3.1.1 It was suggested that the addition of new Special Provision A197 in the 2015-2016 Edition of the Technical Instructions had resulted in several discrepancies and redundancies. The special provision provided an exception from the Technical Instructions for UN 3082 — **Environmentally hazardous substances, liquid, n.o.s.** and UN 3077 — **Environmentally hazardous substances, solid, n.o.s.** if the net quantity/net mass per inner packaging was less than 5 L or 5 kg respectively. Amendments to address these discrepancies were proposed and the Secretary was invited to bring them to the attention of the UN Sub-Committee of Experts on the Transport of Dangerous Goods (subsequently referred to in this report for the sake of brevity as the UN Sub-Committee). Proposed amendments included deletion of limited quantity provisions for UN 3082 and UN 3077 on the basis that the quantities permitted were identical to those included in Special Provision A197.

3.2.3.1.2 There was general agreement with the logic of the proposal, but some panel members were against removing the limited quantity provisions. It was reported that some shippers wanted to continue shipping UN 3082 and UN 3077 under the limited quantity provisions and had raised questions as to whether the special provision was mandatory in that small quantities of these substances were not permitted as fully regulated consignments or if small quantities could be consigned as a fully regulated shipment. One member queried whether any of the “not subject to the Technical Instructions” statements in the Technical Instructions were mandatory and suggested that this issue be considered in the future. It was noted that the same question in relation to the corresponding special provision in the UN Model Regulations (SP 375) had also been raised at other modal meetings.

3.2.3.1.3 It was noted during discussion that Special Provision A197 was harmonized for the 2015-2016 Edition of the Technical Instructions with SP 375 of the UN Model Regulations, but that upon reflection some general packing requirements should have been included in the special provision for the air mode. Consequently the proposal was withdrawn, but it was agreed to monitor and consider the issues that were raised over the current biennium. The question related to whether or not the special provision was mandatory would be raised by the Secretary to the UN Sub-Committee, recognizing that this would affect all modes of transport.

3.2.3.2 **UN 3507 — Uranium Hexafluoride, Radioactive Material, Excepted Package (DGP-WG/14-IP/2)**

3.2.3.2.1 The working group was informed of an amendment that had been agreed by the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods during its 45th Session which reclassified UN 3507 — **Uranium Hexafluoride, Radioactive Material, Excepted Package** as a Division 6.1 toxic substance of Packing Group I with radioactive and corrosive subsidiary risks. The Sub-Committee would be seeking to adopt the amendment into the 19th Edition of the Model Regulations at its December meeting. Although the State which had proposed the amendment determined that UN 3507 would not be toxic *by inhalation*, other States did not believe there was enough data available to conclusively support this. There were concerns at the International Atomic Energy Agency (IAEA) that the reclassified substance would not be permitted for transport by air if it were considered to be toxic by inhalation. This would affect the IAEA’s ability to fulfil its mandate to monitor changes to nuclear material inventories in all States which have signed and ratified a safeguards agreement with the IAEA in accordance with the Treaty on the Non-Proliferation of Nuclear Weapons. The working group was

advised that, if necessary, an amendment would be proposed at DGP-WG/15 to provide for the transport of UN 3507 by air.

3.2.3.3 Requirements for Sterilization Devices Containing Nitrogen Dioxide or Nitric Oxide (DGP-WG/14-IP/4)

3.2.3.3.1 The working group was asked to provide comments on the possibility of adopting new special provisions assigned to UN 1067 — **Nitrogen dioxide**, UN 1660 — **Nitric oxide, compressed** and UN 2031 — **Nitric acid**, other than red fuming, with more than 20% and less than 65% nitric acid (Packing Group II) allowing for their transport in sterilization devices on passenger and cargo aircraft in excepted quantities, irrespective of the fact that UN 1067 and UN 1660 were forbidden on both passenger and cargo aircraft and UN 2013 was assigned excepted quantity code “E0”. It was reported that sterilization with these gases or liquids did not require electricity and offered improved compatibility and safety over other materials used for sterilization of medical equipment and devices. This would be useful in emergency and disaster response scenarios. The special provisions were based on Special Provision A131.

3.2.3.3.2 It was suggested that for the use of UN 1067 and UN 1660, any proposal for a special provision would first need to be raised through the UN Sub-Committee as there was nothing currently in the UN Model Regulations that would allow for the transport of these substances other than in accordance with UN P200. However, as the draft special provision shown in the information paper made reference to the substances being transported in gas cartridges, it was suggested the proposer might like to consider the use of UN 2037 instead. On the basis that the UN permits the transport of Division 2.3 gases as UN 2037, it would simply be the appropriate controls and conditions for air transport which would need to be considered.

3.2.3.3.3 A formal amendment proposal based on comments received would be prepared for DGP-WG/15.

3.2.4 Agenda Item 2.4: Part 4 — Packing Instructions

3.2.4.1 Deletion of Certain Packing Instructions for Aerosols (DGP-WG/14-WP/5)

3.2.4.1.1 An amendment to reduce the number of packing instructions for aerosols was proposed. There were currently five packing instructions that were applied to UN 1950, and it was argued that most of the requirements were common. Although there were some differences, it was believed that, other than some additional packing requirements in Packing Instruction 212, most of the differences were unnecessary either because they resulted in a lack of harmonization with the UN Model Regulations or the different requirements were contained in other parts of the Technical Instructions. It was proposed to retain only Packing Instructions 203 and Y203 and to add additional requirements from Packing Instruction 212 into Packing Instruction 203.

3.2.4.1.2 Although there was support in principle for the proposal, there were concerns that some of the provisions in packing instructions being proposed for deletion were still required as they addressed specific conditions for some aerosols. A revised proposal that accounted for these provisions by including them in Packing Instructions 203 and Y203 was agreed.

3.2.4.2 Permitted Outer Packagings of Combination Packagings (DGP-WG/14-WP/7)

3.2.4.2.1 Provisions for drums and jerricans with non-removable heads were added to the 2013-2014 Edition of the Technical Instructions for certain combination packagings for the sake of alignment with the UN Model Regulations. The provisions had been added to the Model Regulations in response to a proposal which identified the existence of very small drums or jerricans with an opening of less than 7 cm which, by virtue of the description in Part 6;3.1.1.5, 6;3.1.2.4, 6;4.1.3.4, 6;3.1.4.3 and 6;3.1.7.5 and the equivalent UN provisions, were considered as closed head and would have therefore not been permitted.

3.2.4.2.2 It was suggested that it would be impossible for these packagings to have an inner packaging in them due to their small size. This caused confusion at acceptance when a packing instruction did not permit single packaging. An amendment to remove provisions for drums and jerricans with non-removable heads was therefore proposed. It was suggested that this would eliminate confusion and, on the basis that it was believed they would never be used, would not have any consequence. Some panel members stated, however, that there were in fact packagings of this type which could contain an inner packaging and did not support the amendment proposal. They also did not support the lack of harmonization with the UN which would result if this amendment was adopted. It was suggested that guidance material be developed to help eliminate confusion.

3.2.4.2.3 The proposer would consider the comments made and seek evidence and examples where these small, non-removable head containers had formed the outer packaging of a combination packaging. He would then either develop a new proposal for the DGP-WG/15 meeting or seek the publication of guidance material.

3.2.4.3 Training Requirements for UN 3373 (DGP-WG/14-WP/8)

3.2.4.3.1 It was reported that a considerable number of reports had been received in one State related to acceptance of UN 3373 — **Biological substance, Category B** which did not comply with Packing Instruction 650. It was suspected that this was the result of a lack of training, recognizing that consignments of UN 3373 packed in accordance with Packing Instruction 650 were not subject to other parts of the Technical Instructions other than those referred to in the packing instruction. The presenter noted a decrease in the number of reports related to UN 3373 after specific training was given to various entities involved in the air transport of UN 3373. It was therefore proposed to amend Packing Instruction 650 by adding a requirement for operators to be trained in accordance with Part 1;4 of the Technical Instructions.

3.2.4.3.2 Although there was support for the intent of the proposal, many believed that adding an operator requirement in a packing instruction was inappropriate. The importance of training was agreed, but several members did not see an amendment was necessary as dangerous goods training in accordance with Part 1;4 was still required of operators (commensurate with responsibilities) despite the exceptions provided for in Packing Instruction 650.

3.2.4.3.3 The proposer would consider the comments made and potentially develop a new proposal for the DGP-WG/15 meeting.

3.2.5 Agenda Item 2.5: Part 5 — Shipper’s Responsibilities

3.2.5.1 Cushioning Requirements for Overpacks Containing Liquid Dangerous Goods Packed in Single Packagings (DGP-WG/14-WP/3)

3.2.5.2 The addition of new cushioning requirements for overpacks containing single packagings containing liquid dangerous goods was proposed. A number of incidents involving damaged packages within an overpack and leakage of dangerous goods from overpacks during the handling process had been reported in one State, and it was suggested that impact from the movement of packages within an overpack was the main cause of these incidents. An amendment to Part 5;1.1 f) was therefore proposed.

3.2.5.3 There was little support for the proposal as it was believed that the current requirements would prevent such an incident from occurring. It was suggested that a more detailed description of the incidents that occurred be brought to the next working group meeting if the proposer believed there was a deficiency that needed to be addressed.

3.2.5.4 Determination of Transport Index (DGP-WG/14-WP/10)

3.2.5.4.1 It was noted that some radioactive packages permitted for transport had both gamma and neutron emitting radiation and the joint use of Geiger Mueller detectors and neutron detectors was necessary for an accurate calculation of the transport index for such packages. It was reported, however, that some shippers used only one and suggested that this would result in an inaccurate measurement. The addition of a recommendation on determining the transport index in Part 5;1.2.3 was therefore proposed. The text of the recommendation was based on advisory material extracted from the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material.

3.2.5.4.2 Although there was support for the proposal from a safety perspective, the issue of multi-modal harmonization was raised. There was also apprehension with the potential of regulating something that was not an IAEA mandatory requirement. Adding a note under 5;1.2.3 was proposed, but it was thought that the issue should first be reviewed by the IAEA and a proposal brought to the UN Sub-Committee based on this review if deemed appropriate. The Secretary reminded the meeting of the IAEA’s amendment cycle, meaning an amendment proposed now and subsequently agreed by the IAEA would not be incorporated in the Technical Instructions in time for the 2017-2018 Edition.

3.2.5.4.3 It was determined that the issue was complex and needed further consideration. A revised proposal would be prepared for DGP-WG/15.

3.2.6 Agenda Item 2.6: Part 6 — Packaging Nomenclature, Marking, Requirements and Tests

3.2.6.1.1 There were no working papers presented under this agenda item.

3.2.7 Agenda Item 2.7: Part 7 — Operator’s Responsibilities

3.2.7.1 Provisions Concerning Passengers and Crew (DGP-WG/14-WP/9)

3.2.7.1.1 It was suggested that the provisions in Part 7;5 of the Technical Instructions did not apply to crew and that “crew” should therefore be removed from the title of the chapter.

3.2.7.1.2 It was noted that at one time the provisions of Part 8 were included in Part 7 along with the provisions currently in Part 7;5. It was suggested that not removing “and crew” when the provisions for dangerous goods carried by passengers and crew were moved was an oversight.

3.2.7.1.3 It was reported during discussions that there were cases of crew bringing passengers on aircraft who had not obtained tickets through the usual commercial passenger selling process; the example of pilots bringing family on board cargo aircraft with gratis passenger tickets and then considered as crew was provided. Panel members were asked if this had occurred in their States and if so how this would be handled with respect to the provisions in Part 7;5. It was noted that what was normally considered a cargo aircraft was no longer a cargo aircraft when passengers were on board. It would therefore be incumbent upon the operator when they permitted people to travel this way to comply with the provisions of Part 7;5.

3.2.7.1.4 The amendment was agreed.

3.2.7.2 Other Type of Pallet (DGP-WG/14-WP/11)

3.2.7.2.1 An amendment removing references to acceptance of dangerous goods on “other type of pallets” was proposed. It was noted that the term was used in conjunction with the terms “package”, “overpack”, or “unit load device” which were all defined in the Technical Instructions. There was, however, no specific definition for “other type of pallet” and it was suggested that any other type of pallet would be considered an overpack. Consequential amendments to Special Provisions A70, A151 and Packing Instructions 954 and Y963 where the phrase “or other type of pallet” had been introduced to allow shippers to place dangerous goods onto these devices for acceptance by the operator were also proposed.

3.2.7.2.2 Although it was agreed that “other types of pallets” was redundant and references to it could be removed in most cases, the working group wanted to give more thought before agreeing to removing it from Special Provision A70. The amendment was agreed with the understanding that further consideration would be given to Special Provision A70 before the next working group meeting.

3.2.7.3 Passenger Check-In (DGP-WG/14-WP/16)

3.2.7.3.1 An amendment to the provisions requiring operators to ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft was proposed to address emerging technologies related to the check-in process. New systems were in place whereby boarding passes were automatically sent to a passenger’s mobile device without the passenger having to actively check in. The proposed amendment would require operators to ensure that passengers using this type of a system were provided with dangerous goods information.

3.2.7.3.2 It was noted that the provisions for information to passengers had been amended numerous times to address advances in technology. Several panel members felt that thought should be given to revising the entire section by making it less prescriptive and more goal-oriented. This would include a requirement for operators to provide information to passengers on the types of dangerous goods which a passenger is forbidden to carry aboard an aircraft and a method to ensure passengers had acknowledged receiving it.

3.2.7.3.3 Discussions on the subject would continue with the intent of developing a new proposal for DGP-WG/15. It was noted that the term “check-in” was used in the Technical Instructions despite the fact that it was not defined and that in some cases, technology had made the term obsolete. This would be considered when developing a new proposal for DGP-WG/15.

3.2.7.4 Addition of Technical Name for Class 6 Substances (DGP-WG/14-WP/26)

3.2.7.4.1 An amendment was proposed to require the technical name(s) to be shown on the notification to pilot-in-command for Class 6 substances. It was noted that drill letter “Y” was assigned to all infectious substances of Class 6 in the *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481). Drill letter “Y” stated that the appropriate national authority may be required to quarantine individuals, animals, cargo and the aircraft depending on the type of infectious substances on board the aircraft. It was argued that the technical name would be necessary in order to provide this type of information in a timely manner.

3.2.7.4.2 Although some supported the proposal with the recognition that the information would be vital for emergency response, others felt that there would be no additional benefit to safety if the name were added, especially for Division 6.1 substances. These members believed that the robust packaging and small quantities permitted made the likelihood of a safety breach remote, and if the information was needed it was readily available from ground services.

3.2.7.4.3 The Secretary noted that the provisions for infectious substances were developed with the cooperation of the World Health Organization (WHO). She believed the decision to not require the technical name on a package through Special Provision A140 (SP 318 of the UN Model Regulations) was based on security concerns. She offered to contact the WHO for more information which would be provided to the panel. The presenter of the amendment would take this information into account and bring a new proposal to the next working group meeting if deemed necessary.

3.2.8 Agenda Item 2.8: Part 8 — Provisions Concerning Passengers and Crew

3.2.8.1 New Restriction for Medicinal Articles Carried by Passengers or Crew (DGP-WG/14-WP/27)

3.2.8.1.1 An in-flight fire in the aft cargo hold which started from a reaction between potassium permanganate and glycerine in a passenger’s bag was reported. The passenger was carrying these commodities as “medicinal articles”. It was suggested that medicinal articles containing oxidizing agents capable of starting a fire after leaking should not be permitted, and an amendment to the passenger provisions was therefore proposed.

3.2.8.1.2 Although there was sympathy for the proposal, the question of how regular passengers would know the chemical makeup of their articles was raised. Concerns were also raised in respect to potential difficulties in training staff on how to effectively communicate the prohibition to passengers. The proposal was withdrawn with the intention of bringing a revised proposal to DGP-WG/15.

3.3 Agenda Item 3: Development of recommendations for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2017-2018 Edition

3.3.1 No working papers were presented under this agenda item.

3.4 Agenda Item 4: Development of recommendations for amendments to the *Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods* (Doc 9481) for incorporation in the 2017-2018 Edition

3.4.1 No working papers were presented under this agenda item.

3.5 Agenda Item 5: Review of provisions for the transport of lithium batteries

3.5.1 Agenda Item 5.1: Improved hazard communication for energy storage devices

3.5.1.1 Improved hazard communication for energy storage devices was addressed during discussions on working papers related to lithium batteries which will be presented to the Forty-Sixth Session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods (Geneva, 1 to 9 December 2014) (see paragraphs 3.5.6.6.1 b) and 3.5.6.6.2 to 3.5.6.6.5 of this report).

3.5.2 Agenda Item 5.2: Simplification and clarification of provisions

3.5.2.1 Addressing inconsistencies and deficiencies in relation to the provisions for the transport of excepted lithium batteries

3.5.2.1.1 A number of working papers related to Section II of the lithium battery packing instructions were presented. Some of these were developed for discussion under other lithium battery agenda sub-items, but it was determined that all of the amendments proposed in the following working papers addressed similar intents and that it would be more effective to have an over-all discussion on all of the issues raised in these papers under this agenda sub-item:

- a) Proposed new requirement for shippers to declare the total net quantity or number of lithium cells or batteries within each package (DGP-WG/14-WP/2) (Agenda Item 5.6);
- b) Additional considerations for Section II of the lithium battery packing instructions (DGP-WG/14-WP/17) (Agenda Item 5.2);
- c) Limitations on overpacks, consolidations and shipper loaded units for Section II of Packing Instruction 965 and Packing Instruction 968 (DGP-WG/14-WP/19) (Agenda Item 5.4); and
- d) Use of overpacks for Section II Lithium Batteries (DGP WG/14-WP/24) (Agenda Item 5.6).

Bulk shipments of excepted lithium batteries

3.5.2.1.2 The working group was reminded of amendments to Packing Instructions 965 and 968 developed at DGP-WG/LB/1 aimed at reducing the number of “bulk” shipments (i.e. multiple packages of lithium batteries placed in an overpack or a unit load device) of lithium batteries packed in accordance with Section II of those packing instructions. The panel developed the amendments with the expectation that shippers of small lithium cells and batteries would use the revised Section II provisions when

shipping small quantities of lithium ion and lithium metal cells or batteries packed on their own while larger quantities would be shipped using Section IB of Packing Instruction 965 or Packing Instruction 968. This, however, was proving not to be the case and some shippers, rather than moving to Section IB for larger quantities of lithium batteries, had simply been using the Section II provisions by assembling multiple packages together into overpacks. Because these shipments complied with the Section II provisions, they were not subject to acceptance checks, therefore operators had no way of knowing the number of packages of batteries they were loading into a cargo compartment, and the pilot-in-command was not informed of the quantity and location of lithium batteries on board the aircraft. There was also potential for a very large density of cells or batteries to be loaded in the same area when overpacks were used, increasing the risk. It was noted that the Second Meeting of the International Multidisciplinary Lithium Battery Transport Coordination Working Group (Cologne, Germany 9 to 11 September 2014) (subsequently referred to as the Second Multidisciplinary Lithium Battery Meeting) had identified bulk shipments of excepted lithium batteries as a risk to safety and developed a recommendation to prohibit packages of such cells and batteries from being overpacked or consolidated.

3.5.2.1.3 Two working papers proposed amendments related to the use of overpacks. One proposed a complete prohibition on overpacks for batteries shipped in accordance with Section II of Packing Instructions 965 or 968 while the other proposed a limit of up to four packages of lithium batteries within an overpack when shipped in accordance with those packing instructions. Justification for allowing up to four packages of lithium batteries was based on the suggestion that overpacks did offer a level of protection to Section II lithium battery packages which were often very small due to the limited number of cells and batteries permitted. It was felt that setting a limit of up to four packages would reduce the risk posed by larger quantities while still providing the added protection of the overpack. Those who supported a total prohibition believed that the philosophy used by the Instructions in ensuring a package was safe should be applied; if there were small packages entering the transport chain which did not provide sufficient protection to the cells or batteries, measures should be taken to require more robust packaging. The need for a solid safety case for allowing overpacks even if the number of packages contained within were limited was noted, recognizing that the Second Multidisciplinary Lithium Battery Meeting recommended a complete prohibition on overpacks.

3.5.2.1.4 A separate amendment to Packing Instruction 965 was proposed forbidding the consolidation of lithium ion batteries with other shipments of dangerous goods or non-dangerous goods and forbidding them from being loaded into unit load devices before being offered for transport. The prohibition had been applied to lithium metal batteries packed in accordance with Packing Instruction 968 at DGP-WG/LB/2, but no such restriction had been applied to lithium ion batteries at that time since the focus of DGP-WG/LB/2 discussions had been on lithium metal batteries.

Inconsistencies between requirements for exceptions for lithium batteries and requirements for other types of dangerous goods for which exceptions can be applied

3.5.2.1.5 Several discrepancies between the requirements for lithium batteries shipped in accordance with Section II of the lithium battery packing instructions and thus not subject to most of the requirements of the Technical Instructions and the requirements for other types of dangerous goods where exceptions could be applied were identified (e.g. excepted and limited quantities). These included:

- a) the requirement for the name and address of the shipper and the consignee to appear on the outside of each package;
- b) a more specific description of the types of packagings permitted; and

- c) an indication of the number of packages in a consignment containing lithium batteries on the airway bill, when an airway bill was used.

3.5.2.1.6 There was some support for requiring the name and address of the shipper and consignee on the outside of the package, although many felt this had no direct relation to the safety of transport and therefore did not support it. On the basis that Section II packages were often quite small, it was argued that there would be no room for this information to appear, especially for lithium metal batteries where the cargo aircraft only label would need to be applied. The counter-argument was that the packagings needed to be large enough to accommodate the required marks and labels as was required for other dangerous goods.

3.5.2.1.7 There was support for listing a specific description of the types of packagings permitted or for a requirement for the packaging to be rigid and for it to meet general construction requirements. Panel members questioned whether or not some of the packagings they had seen for consignments of Section II lithium batteries would be capable of withstanding normal conditions of transport. It was agreed there was a need to remove any opening for interpretation as to what constituted appropriate packagings for Section II batteries.

3.5.2.1.8 Two proposals were presented which related to an indication of the number of packages in a consignment containing batteries on the air waybill. One of the proposals also included a requirement for the net quantity or number of lithium ion cells or batteries in each package to appear on the air waybill. It was argued that not having this requirement made it difficult for cargo agents or operators to judge whether the shipper had complied with the maximum limits of lithium batteries permitted. There was support for an indication of the number of packages in a consignment containing batteries to appear on the air waybill, but most did not see requiring the number of batteries in the package to be a benefit to safety.

Size of lithium battery packages packed in accordance with Section II

3.5.2.1.9 In considering the size of packages of lithium batteries packed in accordance with Section II of Packing Instructions 965 and 968, it was recognized that although there was a minimum size requirement for the lithium battery handling label, there was no requirement stipulating that the label had to appear on one side of the package. This meant that the label could be applied to a smaller package of lithium batteries by folding it around more than one side of the package — something which was not permitted for dangerous goods subject to the full requirements of the Technical Instructions. It was therefore proposed to require the package to be of sufficient size for the handling label to be affixed to one side of it. There were no objections to this proposal.

Conclusion

3.5.2.1.10 The working group supported the need to prevent bulk shipments of lithium batteries prepared under Section II of Packing Instructions 965 and 968 from being offered for transport. It was important for operators to be aware of large quantities of lithium batteries so that they could determine their own mitigating strategies against the risks they posed.

3.5.2.1.11 Some members recommended that testing be done to determine what size batteries and in what quantities would be considered safe. It was noted that an FAA Technical Centre test on evaluating a main deck wide-body freighter aircraft fire resistant container against a fire involving boxes containing 5000 lithium ion batteries (18650 cells) had resulted in an explosion of gases produced by the lithium ion batteries. Further evaluation of the test results revealed that only 335 of the 5000 lithium ion batteries had become involved in the fire that resulted in the explosion (see paragraph 3.5.4.2.3 of this report). The fact

that reactions were dependent on the chemistry, design, and manufacturer of the battery added additional levels of complexity. It was suggested that mitigating against the worst possible outcome was necessary, and only small quantities should be permitted until such time that approved performance criteria was available.

3.5.2.1.12 A representative from the battery industry suggested that the risks posed by button cell batteries presented a lower risk in transport than other batteries and believed they should not be subject to the same level of restriction. He noted Recommendation 14/14 from the Cologne meeting which supported a method to distinguish lithium metal button cells from other types of lithium metal cells and explained that he was planning to prepare a proposal on button cells for the next working group meeting.

3.5.2.1.13 The working group also supported the need to eliminate inconsistencies between requirements for exceptions for lithium batteries and requirements for other types of dangerous goods for which exceptions could be applied. While the idea of treating excepted lithium batteries as limited quantities or excepted quantities of dangerous goods was an attractive concept, it was recognized that this would require harmonization through the UN Sub-Committee to align with the modal regulations and would therefore be impractical in the short term.

3.5.2.1.14 An observer from an express carrier organization cautioned against over-reliance on operators to detect non-compliant shipments of lithium batteries, recognizing that provisions for Section II batteries were designed to allow for easy transport and that no formal acceptance check from the operator was required. An adviser noted cases of operators being fined for non-compliant shipments when the area of non-compliance was shipper-related.

3.5.2.1.15 The possibility of removing provisions for excepted batteries was briefly raised but not supported.

3.5.2.1.16 The working group decided that addressing the issues raised concerning Section II lithium batteries needed more concentrated consideration from a dedicated group of members. A working group by correspondence would work on developing a comprehensive proposal for DGP-WG/15.

3.5.3 Agenda Item 5.3: Development of guidance material to assist States with oversight and awareness programmes related to the safe transport of dangerous goods, with an emphasis on lithium batteries

3.5.3.1 Outreach Communications — Passenger Awareness Campaign (DGP-WG/14-IP/6)

3.5.3.1.1 The working group was briefed on developments undertaken by the Civil Aviation Safety Authority of Australia (CASA) to ensure passengers were aware of what dangerous goods they were and were not permitted to carry on board an aircraft. These included:

- a) the development of an application for Apple and Android platforms called “Can I pack that?” which could be accessed from the CASA website at www.casa.gov.au/dgapp. A web-based version would also become available on this website. A social media campaign aimed at promoting the application had been underway which highlighted what industry believed to be dangerous goods which passengers were least likely to be aware of in terms of whether they could be carried or under what conditions they could be carried.

- b) a series of posters entitled “top ten least wanted” dangerous goods produced for display at airports; and
- c) a YouTube video on the carriage of lithium batteries by passengers on aircraft. The video was available at <https://www.youtube.com/watch?v=jvxS3-0QzT4&list=UU3ytY1MCWiwMiSyO414izow>.

3.5.3.1.2 The working group expressed its appreciation to the panel member for sharing the material and queried whether the material could be used within other States. Although the material was copyright, States were free to use it provided CASA was advised and it was being used for safety and not commercial interests. The material would be made available on the ICAO dangerous goods website with these instructions.

3.5.4 Agenda Item 5.4: Consideration of recommendations from the International Multidisciplinary Lithium Battery Transport Coordination Meeting

3.5.4.1 Limitations on Overpacks, Consolidations and Shipper Loaded Units for Section II of Packing Instruction 965 and Packing Instruction 968 (DGP-WG/14-WP/19)

3.5.4.1.1 This working paper was discussed under Agenda Item 5.2 (see paragraph 3.5.2.1 of this report).

3.5.4.2 Report of the Second Meeting of the International Multidisciplinary Lithium Battery Transport Coordination Working Group (DGP-WG/14-WP/20)

3.5.4.2.1 The report of the Second Meeting of the International Multidisciplinary Lithium Battery Transport Coordination Working Group was presented to the working group by one of the joint chairmen of that meeting.

3.5.4.2.2 The Multidisciplinary Meeting met from 9 to 11 September 2014 in Cologne, Germany. The meeting considered risks and potential mitigation strategies related to the transport of lithium batteries by air through input from experts in the fields of dangerous goods, operations and airworthiness and from representatives of the aircraft and battery manufacturing industries.

3.5.4.2.3 The chairman gave a presentation on new tests performed at the FAA Technical Centre involving fire resistant containers and fire containment covers for large shipments of lithium batteries which had been presented to the Multidisciplinary Meeting. He noted that previous tests had demonstrated the ability of fire resistant containers and fire containment covers to contain fires involving cargo other than lithium batteries, but that tests had shown the ineffectiveness of these containers and covers to control a lithium metal fire. New tests involving lithium ion batteries demonstrated that combustible gases emitted by the propagation of lithium ion cells in thermal runaway could collect and cause an explosion even in the presence of a suppression agent in the container. Test results varied depending on the types of cells involved, some being more volatile than others. He reiterated that fire resistant containers and fire containment covers were effective with regular cargo fires and that the test results were not an indication of failure of the containers and covers but rather of the hazards of the lithium cells. The chairman also provided background information on certification requirements for cargo compartment fire protection and emphasized that although all passenger aircraft certified since 2004

required built-in fire detection and suppression systems in non-accessible cargo compartments, not all States retrofitted their older aircraft to these same standards.

3.5.4.2.4 The chairman summarized the work of the multidisciplinary meeting by explaining that the group determined there was no one solution that would eliminate the risks posed by lithium batteries. A layered approach to reducing the risks was necessary; this would include battery safety, regulation, performance packaging, fire suppression systems, cargo compartment capabilities, and aircraft limitations. The group developed fourteen recommendations which would involve expertise from the DGP, the Flight Operations Panel, the Airworthiness Panel and airframe manufacturers. The recommendations (reproduced in Appendix B to this report) addressed short and long-term goals. Long-term goals included the development of packaging performance criteria standards while short-term goals included transporting batteries at a reduced state of charge and ensuring that operators were aware of large shipments of batteries so that they could consider their own mitigating strategies. Each recommendation would be assigned to one of these groups as the lead, and that group would coordinate with the other relevant groups as necessary. It was suggested that the DGP would take the lead role in addressing Recommendations 1/14, 2/14, 3/14, 8/14 and 14/14 (see Appendix B to this report). Some panel members expressed a view that the lead role for Recommendations 4/14, 5/14 and 10/14 should also be assigned to the DGP, in light of the current provisions regarding loading and stowage of dangerous goods that were already contained in the Technical Instructions. Others stressed that although the role of the lead group was important, the degree of coordination and cooperation fostered between groups would be the essential element towards making informed and effective decisions.

3.5.4.2.5 The working group was asked to consider the recommendations developed by the multidisciplinary meeting with the aim of developing provisions for DGP-WG/15.

3.5.5 Agenda Item 5.5: Consideration of safety recommendations from the General Civil Aviation Authority of the United Arab Emirates (GCAA UAE) on the accident involving a Boeing 747 44AF on 3 September 2010 near Dubai

3.5.5.1 Response to Safety Recommendations Arising from an Accident Investigation (DGP-WG/14-WP/21)

3.5.5.1.1 The working group was reminded of a working paper presented at DGP/24 containing three safety recommendations pertaining to dangerous goods arising from the investigation of an accident involving a Boeing 747-44AF on 3 September 2010 near Dubai, United Arab Emirates (see paragraph 5.1.15 of the DGP/24 Report). Discussion of the recommendations at DGP/24 was limited due to the focus of that meeting on mitigating risks associated with the transport of lithium metal batteries. The working group was invited to provide feedback to the Secretariat on the recommendations and to develop an action plan for addressing them.

3.5.5.1.2 The United Arab Emirates General Civil Aviation Authority (GCAA) recommended in SR 51/2013 that ICAO review whether the classification of lithium batteries and other energy storage devices as Class 9 adequately reflected the inherent risks to aviation safety, specifically in relation to hazard communication and quantity limits. The issue of hazard communication for electric storage devices had been and continued to be the subject of discussion within the DGP, and the issue was raised at the UN Sub-Committee of Experts on the Transport of Dangerous Goods. The working group reviewed an amendment aimed at improving hazard communication for lithium batteries and other Class 9 substances and articles which would be presented to the Forty-Sixth Session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods (ST/SG/AC.10/C.3/2014/89) (see paragraphs 3.5.6.6.1 b) and 3.5.6.6.2 to 3.5.6.6.5 of this report). Amendments agreed at the 46th Session of the UN Sub-

Committee were expected to be approved by the Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals in December 2014 and would then be considered by the DGP for incorporation in the 2017-2018 Edition of the Technical Instructions.

3.5.5.1.3 Recommendation SR 52/2013 of the UAE GCAA Report related to the development of Standards for package level protection of batteries being shipped. The working group noted the recommendations developed by the Second Meeting of the International Multidisciplinary Lithium Battery Transport Coordination Working Group (Cologne, Germany 9 to 11 September 2014) on developing performance-based provisions that would limit the probability of propagation of thermal runaway between cells and developing performance-based packaging as a means to add additional protective layers to mitigate risks. As an interim measure, the multidisciplinary meeting recommended limiting the state of charge of batteries being transported to reduce the probability of propagation of thermal runaway. The DGP was tasked with addressing these recommendations.

3.5.5.1.4 Recommendation SR 52/2013 of the UAE GCAA Report was a general request to the DGP through a dedicated task force to develop an amendment to the vibration test criteria for lithium batteries contained in the UN *Manual of Tests and Criteria* to address structural-acoustic coupling phenomenon. Panel members were unaware of this phenomenon and suggested that the area of expertise to address it was not within the purview of the DGP.

3.5.5.1.5 The Secretary would provide this report to the ICAO Accident Investigation Section (AIG) and would suggest that the UAE GCAA be requested to provide more specific information on the recommendation related to acoustic coupling.

3.5.6 Agenda Item 5.6 Miscellaneous lithium battery issues

3.5.6.1 Proposed New Requirement for Shippers to Declare the Total Net Quantity or Number of Lithium Cells or Batteries within each Package (DGP-WG/14-WP/2)

3.5.6.1.1 This working paper was discussed under Agenda Item 5.2 (see paragraph 3.5.2.1 of this report).

3.5.6.2 Drop Test Requirement for Packages Containing Lithium Batteries (DGP-WG/14-WP/4)

3.5.6.2.1 It was reported that there had been several cases where inner packagings of lithium batteries were damaged despite there being no obvious damage to the outer packagings. It was suggested that damage to inner packagings could lead to battery-to-battery or cell-to-cell contact and to the potential for producing a short circuit. An additional requirement for damage to inner packagings to be considered as part of the 1.2 m drop test requirements in Section IB and II of Packing Instructions 965 and 968 and Section II of Packing Instructions 966 and 967 was therefore proposed.

3.5.6.2.2 The working group understood the intent of the proposal, but the majority believed that if damage to the inner packaging did result in battery-to-battery or cell-to-cell contact, the batteries or cells would have shifted. The shifting would preclude such a package from passing the existing criteria for the 1.2 m drop test. On that basis, they did not believe an amendment was necessary.

3.5.6.2.3 The proposer stressed her concern with the quality of inner packagings being used at several lithium battery factories in her State. Recognizing that packaging used for consignments prepared

in accordance with Section IB or II of Packing Instructions 965 and 968 were not subject to UN packaging performance tests, she believed that strengthening the requirements for inner packagings was necessary.

3.5.6.2.4 The proposer expressed appreciation for the comments received and would take them into account for further consideration of the issue.

3.5.6.3 Labelling of Overpacks Containing Lithium Batteries (DGP-WG/14-WP/14)

3.5.6.3.1 The working group was reminded that a lithium battery handling label was not required on packages of lithium batteries contained in equipment when the package contained four or less cells or two or less batteries. It was suggested that this led to confusion when an overpack contained several packages of lithium batteries. Would a handling label be required on the overpack on the basis that the total number of batteries in the overpack exceeded four cells or two batteries? Or would no handling label be required on the overpack on the basis that the requirement to label an overpack was based on whether or not the packages inside required labels? It was suggested that a lithium battery handling label should be applied to overpacks containing more than four batteries or two cells regardless of whether or not the packages contained within required the label. An amendment to Section II of Packing Instructions 967 and 970 was therefore proposed.

3.5.6.3.2 Although there was sympathy for the intent of the proposal, it was believed that the revised provisions went against the philosophy applied to the requirements for overpacks containing dangerous goods whereby the hazard communication on the overpack was representative of what was on the packages inside the overpack. It was felt that this could lead to confusion on the part of operator acceptance staff when packages visible through the overpack did not contain a label while the overpack did.

3.5.6.3.3 It was recognized that the intent of the proposal was to remove potential deficiencies in the Section II provisions and that several other working papers contained amendments with the same intent. These were discussed under Agenda Item 5.2 (see paragraph 3.5.2.1 of this report).

3.5.6.4 The Detection of Lithium Cells and Batteries through X-Ray Screening (DGP-WG/14-WP/15)

3.5.6.4.1 A report from an x-ray screening equipment manufacturer contracted by the United Kingdom Civil Aviation Authority (CAA) to examine the feasibility of using x-ray equipment to automatically detect lithium cells and batteries was presented to the working group. The CAA determined that although advances in x-ray screening technology had resulted in the ability for x-ray screening to be automated resulting in improved security screening with less human interaction, an unintended consequence was that undeclared dangerous goods, including undeclared lithium batteries, were less likely to be detected.

3.5.6.4.2 The report indicated that effective detection of lithium cells and batteries was feasible. Although the degree of confidence varied depending on the size and number of cells/batteries in a cargo being screened along with the amount/density of other products in the same cargo, bulk consignments of lithium batteries, which had been identified as the greatest concern so far as fires on board aircraft were concerned, were able to be detected with a high degree of confidence.

3.5.6.4.3 As a result of the research project's findings, the United Kingdom CAA was looking to develop an operational performance standard which manufacturers of x-ray equipment in general could

potentially meet. The CAA was therefore proposing to initiate standard-setting by an appropriate international industry body.

3.5.6.4.4 One of the challenges with this system was that security screeners in many States did not believe it was within their purview to screen for dangerous goods. There were concerns in the security world that expanding duties to focus more attention on detecting dangerous goods would weaken the ability to detect items which were a security threat. Members agreed that more work needed to be done to emphasize the need for increased attention on detecting dangerous goods. Although the duties may be considered separately within industry, the end goal for both was safe transport. It was suggested that customs agents and postal authorities also had a role to play in detecting undeclared dangerous goods and items which could be a security threat and that a multidisciplinary approach involving all should be encouraged.

3.5.6.4.5 An appropriate group to discuss the issues raised would be the Joint Task Force of the Dangerous Goods and Aviation Security Panels, but it was noted that communication from AVSECP members of the task force had been less than forthcoming. The Secretary agreed to coordinate with the ICAO AVSEC Section in an effort to foster better communication. The report from the x-ray screening equipment manufacturer and the views of the DGP would be provided to the next meeting of the Aviation Security Panel (AVSECP).

3.5.6.5 Lithium Batteries — Improving Compliance (DGP-WG/14-WP/22)

3.5.6.5.1 The Secretary invited the working group to discuss issues surrounding both unintentional and deliberate non-compliance in relation to the transport of lithium batteries by air. She noted the potential for non-compliance by both shippers who shipped undeclared or non-compliant shipments of lithium batteries and by manufacturers who did not subject lithium batteries to UN testing.

3.5.6.5.2 Panel members had stressed the importance of effective State oversight, particularly in large lithium battery manufacturing States. However, it was suggested that building an effective oversight system was difficult because of:

- a) the complexity of the regulatory framework;
- b) the enormous quantities being shipped by air;
- c) the fact that numerous entities played a role in achieving compliance, including cell manufacturers, battery manufacturers, and all manufacturing entities who used these cells or batteries downstream who could potentially be from different States;
- d) the expectation that oversight was required for excepted lithium batteries, recognizing that these excepted batteries ended up in the general cargo stream.

3.5.6.5.3 It was suggested that the complexity of the regulatory system increased the likelihood of unintentional non-compliance by shippers. The Secretary noted that members of the Air Navigation Commission (ANC) had raised concerns in relation to the complicated provisions and questioned whether exceptions from the lithium battery provisions were necessary. If they were necessary, they emphasized that they should be limited and only if safety could be assured. She noted that many of the arguments against adding further safety restrictions involved the need for just-in-time delivery of products, suggesting that this was a facilitation issue and that safety should not be compromised for the sake of facilitation needs. She noted that the risks posed by lithium batteries varied depending on the size, design

type and quantities shipped, yet all were regulated under only two major groups: lithium metal or lithium ion. She suggested that consideration be given to adding new UN numbers to provide for more granularity.

3.5.6.5.4 The working group was also invited to discuss ways to ensure lithium batteries had been subjected to testing in accordance with the UN *Manual of Tests and Criteria*. It was suggested that this may sometimes be impossible to do, especially in cases where cells or batteries are shipped multiple times during their production life cycle, each shipper being responsible for knowing that the cell or battery had been successfully tested. The group was asked to consider whether a standardized test report, a copy of which would be supplied with the cell or battery, would be an effective tool for ensuring compliance. The group was also asked to consider whether including a list of “approved” test laboratories in the Technical Instructions would help.

3.5.6.5.5 The Secretary reported that the risks posed by lithium batteries and the need for appropriate outreach and oversight would be raised at an upcoming meeting of the Asia and Pacific Region (APAC) Regional Aviation Safety Group (RASG). It was envisaged that this forum would provide an opportunity for all parties involved to exchange ideas on effective oversight strategies in the Asia and Pacific Region, a region which included a number of States with significant cell or battery manufacturers.

3.5.6.5.6 The issues raised in the working paper prompted a lengthy discussion. The importance of State oversight was emphasized, as was the need for appropriate enforcement. Strong enforcement was needed for those who deliberately circumvented the regulations without any concern for the consequences. It was hoped that this would be stressed at the upcoming APAC RASG meeting.

3.5.6.5.7 Efforts taken in one significant battery manufacturing State to improve safety were highlighted. These included the requirement for lithium batteries prepared in accordance with Section II of the lithium battery packing instructions to be transported as dangerous goods and not as general cargo and a requirement for training for everyone in accordance with an approved lithium battery training programme. The legal authority to oversee manufacturing activities did make effective oversight a challenge.

3.5.6.5.8 Other panel members expressed concern with the level of responsibility members of the battery industry were expecting of aviation authorities. Aviation authorities did not typically have any oversight authority over manufacturing entities in their States. On the basis that the manufacturing process was critical to safety, ensuring entities that did have the authority were providing effective oversight was something that needed to be addressed.

3.5.6.5.9 The working group recognized the need for simplified regulations, but cautioned that a balance between change and stability in the regulations was necessary. With regard to test reports, it was noted that even though manufacturers were required to provide them upon request, reports for batteries down the distribution chain were often difficult to obtain as the original manufacturer was not always known. The use of safety data sheets could be a way for shippers to verify classification, but there was a lack of strong support for requiring these to accompany shipments. There was some scepticism in that entities who deliberately non-complied would simply produce fabricated test reports. The need for effective enforcement was again emphasized in this regard. While members recognized the benefit of providing a list of approved test laboratories, several stated that this went beyond their regulatory authority within their State.

3.5.6.5.10 The idea of requiring a declaration that cells or batteries had passed the required tests was raised, and a representative from the battery industry indicated that he was recently involved with

discussions on standardizing a declaration of conformity. He would inform his industry that the need for test information to be more visible had been raised. He did not, however, believe requiring a standardized report to accompany batteries was feasible, recognizing that these reports were several pages long.

3.5.6.5.11 The chairman of the UN Sub-Committee outlined principles which support the provisions of the UN *Manual of Tests and Criteria* which he thought could influence the working group's deliberations. He noted that the testing criteria were common to all modes of transport and any extra requirements would need to be functional for all modes. He clarified that the test requirements in the manual were intended for the purpose of classification only and should not be interpreted as an indication of whether an article or substance could be transported safely. He explained that any amplified test procedures to ensure quality should be considered in Part 6 of the Model Regulations, not the Manual of Tests and Criteria. He also noted that although test reports were referred to in the manual and examples provided, none of these were mandatory. He suggested that requiring test reports to be provided with lithium batteries would be a significant shift in philosophy.

3.5.6.5.12 The Secretary thanked the group for their contributions.

3.5.6.6 UN Sub-Committee of Experts on the Transport of Dangerous Goods Working Papers on Lithium Batteries (DGP-WG/14-WP/23)

3.5.6.6.1 The working group was asked to provide comments to the Secretariat on seven working papers related to lithium batteries which had been submitted for consideration at the Forty-Sixth Session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods (Geneva, 1 to 9 December 2014). These were:

- a) The addition of a statement on the transport document indicating that transport was in accordance with SP 301 of the Model Regulations. SP 301 provided relief from the UN testing requirements for small production runs of lithium cells and for exceptions from certain pre-production prototypes of cells and batteries.
- b) An amendment aimed at improving hazard communication for lithium batteries (and other Class 9 substances and articles). The amendment included a new Class 9 label for lithium batteries and the lithium battery handling label, currently required in accordance with Section IB and Section II (where applicable) of the lithium battery packing instructions in the Technical Instructions. The UN number was proposed to be added to the lithium battery handling label.
- c) A proposal to add definitions for "cell", "battery" and "single cell battery" in the Model Regulations based on the definitions contained in the UN *Manual of Tests and Criteria*. It was noted that the Technical Instructions currently contained definitions for cell and battery in Attachment 3 which were replicated from the *Manual of Tests and Criteria*.
- d) A proposal to amend SP 188 of the Model Regulations to clarify that devices which were simply a source of power to another piece of equipment must be treated as batteries and not as equipment. The need for the amendment was prompted by the recognition that power packs used to recharge lithium battery powered equipment were being classified both as lithium batteries contained in equipment and as batteries.

- e) The addition of a new special provision for modes other than sea or air transport allowing for the exceptions for lithium batteries in SP 188 to apply to larger batteries (i.e. 300 Wh instead of 100 Wh).

Comments raised by the working group on sub-paragraphs b), d) and e) are provided below

Improved hazard communication for lithium batteries and other Class 9 articles or substances

3.5.6.6.2 It was noted that the need for improved hazard communication was first raised by the DGP. Accordingly, the Secretary had brought a paper on the subject to the Forty-fourth Session of the UN Sub-Committee. The Sub-Committee at that time noted the lack of appropriate hazard communication conveyed by the Class 9 marking and labelling system for all articles and substances, not just lithium batteries.

3.5.6.6.3 On that basis, the amendment proposed to the UN Model Regulations included several new marking and labelling requirements for Class 9. An appropriate pictogram to the lower half of the existing Class 9 label was proposed, with nine different pictograms developed to that effect. The pictogram for lithium batteries was based on the one used on the lithium battery handling label required by the Technical Instructions. A new requirement for a lithium battery mark was also proposed. The mark contained the same lithium battery pictogram proposed for inclusion on the Class 9 label and would also require the specific UN number.

3.5.6.6.4 The working group agreed that the amendments addressed many of the DGP's concerns with the lack of clear communication in relation to lithium batteries, but a number of comments were raised. It was stressed that the intent of improving hazard communication for lithium batteries was to better alert emergency responders and to offer the potential for segregation from other classes of dangerous goods that may increase the risks posed by lithium batteries. Although there was support for the development of a specific Class 9 label for lithium batteries, it was feared that the possibility of one of eight other pictograms to appear on the label would detract from the overall objective of hazard communication for lithium batteries. It was felt that some of the other pictograms were too detailed and some conveyed information on what article or substance was contained in the package rather than the actual hazard posed.

3.5.6.6.5 There was support for the addition of a handling label for all modes of transport but it was suggested that consideration for closer harmonizing with the label required by the Technical Instructions be given. The minimum dimensions required were different from the Technical Instructions, and there were no provisions for a smaller label to appear on smaller packages. It was also suggested that the colour red be specified in relation to the rectangular hatching required. Consideration should also be given to indicate the telephone number on the label as was done in the Technical Instructions, noting that a telephone number for additional information was required to be marked on the package in accordance with current SP 188. The Sub-Committee's reticence to include too much wording on a label was noted, recognizing that this caused difficulties related to translation. Use of pictograms was encouraged instead of words as much as possible.

Consideration of what constitutes equipment

3.5.6.6.6 There was strong support for the proposal to amend SP 188 of the Model Regulations to clarify that those devices whose sole purpose was to provide power to another piece of equipment must be treated as batteries and not as equipment. A similar proposal was made at DGP/24 and, although amendments to the passenger provisions had been agreed, the panel had determined that for the sake of

multimodal harmonization, amendments related to cargo needed to be addressed by the Sub-Committee first.

3.5.6.6.7 Whether there would be a need to retest batteries which would now be considered on their own when they had previously been tested as part of equipment was raised. A representative of the battery industry suggested these articles should be considered equipment containing lithium batteries. To be classified as lithium batteries, the articles would be subject to UN testing, but that this was not done for such devices. Instead the cell or battery inside the device was submitted for testing and then incorporated into the article. He disagreed with the proposal.

3.5.6.6.8 Panel members supported the proposal citing many concerns related to e-cigarettes. There had been many incidents reported in several States involving such articles (see paragraph 3.5.6.7 below).

New special provision allowing for the exceptions for lithium batteries in SP 188 to apply to larger batteries (i.e. 300 Wh instead of 100 Wh) for modes other than sea or air transport

3.5.6.6.9 Members noted the significant increase in watt hours permitted for excepted lithium batteries that was proposed and raised concerns that the amendment would introduce a new hazard for the air mode, since it would be difficult to prevent these excepted batteries from being loaded on an aircraft. Members also cautioned against introducing new exceptions for specific modes of transport as this would add another level of complexity to the already complex lithium battery provisions.

3.5.6.7 Passenger provisions to carry e-cigarettes

3.5.6.7.1 Although not raised in a working paper, the working group was asked to discuss safety concerns related to the carriage of e-cigarettes by passengers. Several incidents had been reported involving e-cigarettes overheating by way of their heating element being accidentally activated resulting in a fire in checked baggage. These e-cigarettes had been considered personal electronic devices (PEDs) in some cases, but it was suggested that the restrictions placed on PEDs in Table 8-1 of the passenger provisions did not adequately address the risks posed. The PED provision provided examples of electronic battery powered devices such as cameras, watches and cell phones, none of which contain a heating element. It was suggested that the restrictions placed in the passenger provisions for battery-powered equipment capable of generating extreme heat, which could cause a fire if activated (Table 8-1, item 16), more appropriately addressed the risks, but that the provision to carry these devices as checked baggage and the need for operator approval should not apply to e-cigarettes. It was agreed that a new entry based on the specific risks posed by e-cigarettes was necessary. An amendment would be proposed at DGP-WG/15 for incorporation in the 2015-2016 Edition of the Technical Instructions by way of an addendum, but the working group was asked to consider what measures could be taken in the near-term to address the risk.

3.5.6.7.2 The working group shared the concerns raised and agreed that an amendment to Table 8-1 was necessary but did not believe an amendment should be made in haste and that a proposal for consideration at DGP-WG/15 was more appropriate. All supported the need for outreach to ensure that the safety risks were known. The Secretary suggested that an e-Bulletin to all States could be issued along with guidance material on the ICAO public website. Members agreed that this was an appropriate way forward and would undertake efforts to disseminate the information conveying the risks posed by e-cigarettes carried in checked baggage as widely as possible within their States.

3.5.6.8 Use of Overpacks for Section II Lithium Batteries (DGP-WG/14-WP/24)

3.5.6.8.1 This working paper was discussed under Agenda Item 5.2 (see paragraph 3.5.2.1 of this report).

3.5.6.9 PED Emergency Response Training (DGP-WG/14-WP/25)

3.5.6.9.1 A new note emphasizing the importance of specific training in responding to a fire involving a lithium battery in a portable electronic device was proposed for inclusion with the training provisions in Part 1;4. Specific procedures by cabin crew needed to be followed in order to respond to an incident involving lithium battery fires, and it was argued that these procedures were counterintuitive for many cabin staff. The note would highlight the importance of proper training.

3.5.6.9.2 The working group recognized the need to ensure that training took place, but it was felt that a more effective way to highlight this would be to include provisions in Annex 6 — *Operation of Aircraft*. It was suggested that training programmes for flight and cabin crew were not typically based on Annex 18 provisions but rather those of Annex 6.

3.5.6.9.3 The potential for lessening the importance of training for emergency procedures involving other kinds of dangerous goods should emergency procedures for lithium batteries be singled out was raised, but the presenter noted that the majority of incidents currently occurring in the cabin did involve lithium batteries. He suggested that this, coupled with the fact that lithium battery fires required unique emergency response procedures, made placing extra focus on them necessary.

3.5.6.9.4 The presenter would consider revising his proposal based on comments provided for submission to the next DGP working group of the whole.

3.5.6.10 Transporting Damaged or Defective Lithium Batteries and Lithium Batteries Contained in Equipment (DGP- WG/14-WP/28)

3.5.6.10.1 It was reported that there was a need to transport damaged or defective lithium batteries by air for immediate failure analysis. An amendment allowing for the transport of damaged or defective lithium ion or lithium metal cells and batteries and equipment containing them with the approval of the State of Origin and the State of the Operator was therefore proposed. The amendment included a revision to Special Provision A154 of the Technical Instructions, which currently forbids the transport of damaged or defective lithium batteries, and a new packing instruction for incorporation into the Supplement. The proposed packing instruction was based on the provisions in the 18th Revised Edition of the UN Model Regulations for damaged and defective batteries which included a requirement for a thermal resistant packaging or overpack, performance criteria and a test method for the packaging or overpack. The proposed performance criteria and test method was designed to ensure that any packaging used to transport damaged or defective lithium batteries or equipment containing them would be capable of containing a potential thermal event.

3.5.6.10.2 Some supported the development of provisions allowing for the transport of damaged or defective batteries on the basis that there was an occasional need to transport them by air and there should be provisions to allow for their safe transport. Several panel members strongly believed that the risks posed by regular lithium batteries needed to be mitigated before considering provisions for damaged or defective batteries. The risk of compromising safety for the benefit of facilitation was something that needed to be taken into account. This position was shared by representative of the airframe manufacturing

industry who believed that further efforts in relation to packaging which was capable of containing the risks were needed. The Secretary noted the ANC's disappointment that the panel could not complete provisions for the transport of lithium metal batteries on passenger aircraft under an approval. She suggested that the Commission would therefore not expect to be asked to review provisions for damaged and defective batteries, although one panel member suggested that the two types of provisions could not be compared.

3.5.6.10.3 The working paper noted the issuance by one State of a special permit authorizing the transport of damaged or defective batteries and equipment containing them and provided a copy of that permit. An adviser from the State issuing the permit stressed that it was not intended for broad use but rather for a legitimately urgent need to transport certain lithium ion cells and batteries that may be damaged or defective and may be contained in equipment. There had yet to be any shipments made under the permit. He also noted several differences between the permit and the provisions proposed and stressed that the permit applied to lithium ion only while the proposal applied to both lithium ion and metal. The permit included several additional safety enhancements which the proposal did not include.

3.5.6.10.4 Although there was little support for including provisions for damaged or defective batteries in the Supplement at that time, there was recognition that some of the requirements in the proposal were useful and could potentially be applied to the transport of regular batteries. A number of comments related to the actual provisions were raised, including:

- a) There were several requirements which applied to the package *or* the overpack — requirements must at a minimum apply to the packaging;
- b) Paragraph 4 g) of the packing instruction included criteria for passing the thermal packaging test; this should be reflected in the heading;
- c) The special provision and the packing instruction referred to the *capability* of meeting test criteria; the tests should *demonstrate* the ability to pass criteria;
- d) It was suggested that the test provided in the packaging instruction should be referred to as a fire test and not a thermal test; and
- e) There was no limit to the size of the battery or the number of batteries permitted; it was suggested that a limit be set for the energy density and the number of batteries permitted be limited to one.

3.5.6.10.5 The proposer thanked the group for comments provided and would share them with members of his industry.

3.5.6.11 Effect of Cell State-of-Charge on Outcome of Internal Cell Faults (DGP-WG/14-IP/1) and Shipping Lithium Ion Cells, Implications on State of Charge (DGP-WG/14-IP/8)

3.5.6.11.1 It was recalled that the Second Multidisciplinary Lithium Battery Meeting recommended that all lithium ion cells intended for transport be limited to a state of charge of no more than 30 per cent as an interim means to reduce the probability of propagation of thermal runaway between cells. In light of this recommendation, a presentation was given by a representative of the battery industry on the safety effects and current industry practices related to the transport of lithium ion cells at a reduced state of charge.

3.5.6.11.2 The battery industry representative stated that:

- a) properly designed and manufactured lithium ion cells do not lose their state of charge quickly over time, provided they are shipped and stored according to manufacturers' specifications;
- b) enhanced degradation of cell components may occur when cells at a high state of charge are shipped and stored at elevated temperatures;
- c) an over-discharged cell and degradation of cell components may occur when cells at a low state of charge are shipped and stored. This may result in cell thermal runaway upon recharging;
- d) over-discharging occurs at an increasing rate at lower states of charge; and
- e) safety features in cells and batteries generally protect against over-discharge conditions.

3.5.6.11.3 The representative presented test data on lithium ion cells at various states of charge that showed the additional level of safety provided when cells are shipped at 50 per cent or less state of charge. The testing revealed:

- a) at 100 per cent state of charge, a refined crush typically produced severe outcomes;
- b) at 70 per cent state of charge, a refined crush resulted in severe outcomes for a majority of tests;
- c) at 50 per cent state of charge, all tests but one resulted in a minimum outcome (one test resulted in a moderate outcome (case rupture)); and
- d) at 40 per cent state of charge, all of the tests resulted in a minimum outcome.

3.5.6.11.4 The representative suggested that a cell leaving a factory at a 30 per cent state of charge could be faced with over-discharge conditions if it were exposed to elevated temperatures for an extended period of time. He noted that cells and batteries are normally shipped multiple times, meaning they could theoretically be transported safely by air, be put in storage at elevated temperatures which may result in over-discharge conditions, and then be transported by air again. He informed the group that lithium ion cell manufacturers had determined a 40 to 50 per cent state of charge to be the optimum condition for maximizing cell performance, quality and safety. He noted that transporting lithium ion batteries by air was more critical than transporting lithium metal batteries by air, since lithium ion batteries discharged while lithium metal batteries could last for years.

3.5.6.11.5 Several members were not convinced that the information provided from the representative meant that the recommendation from the multidisciplinary meeting for 30 per cent state of charge should not be supported, noting the significant effects on reducing propagation of thermal runaway. A graph provided by the representative to illustrate the discharge curve at various states of charge did not appear to be significantly greater at 30 per cent state of charge than it did at 40 to 50 per cent state of charge. Recognizing that the length of time a cell or battery was in transport was not limited, over a long period of time over-discharge would be a risk no matter what the state of charge of the battery or cell was when it was first offered for transport. The question of how this risk was addressed today was therefore raised. The battery representative noted that most batteries were transported and used

quickly, and well-manufactured batteries had safety features to prevent the potential consequences from recharging after an over-discharged condition.

3.5.6.11.6 The battery representative noted that knowing the state of charge was difficult for shippers the further down the transportation chain they were and that a limit would be difficult to enforce. Others stressed, however, that reducing the state of charge for cells was only one mitigation strategy that was intended to be utilized as a short-term, interim mitigation measure until a packaging performance solution could be established. Even though the state of charge limitation could be difficult to enforce, many battery manufacturers would comply with the limitations.

3.5.6.12 Further Restrictions on the Transport of Medical Devices aboard Aircraft (DGP-WG/14-IP/5)

3.5.6.12.1 The working group was urged to consider the consequences that restrictions on the transport of lithium batteries had on industry, in particular the medical industry, and asked to consider alternatives to unnecessary restrictions. Although the presenter shared concerns with the risks posed by lithium batteries and the number of incidents reported, he argued that medical devices containing lithium batteries were required to meet high standards of quality and performance, recognizing the potential for life-threatening implications should the device fail. The devices were offered to the public after years of research and development and were subject to clinical trials, regulatory oversight and compliance with rigorous standards and testing. He suggested the potential for serious and adverse impacts to public safety and health when restrictions were implemented without appropriate consideration of the consequences beyond aviation safety. He advocated for all disciplines that may be impacted by decisions taken by the DGP to be present at meetings, noting that not all disciplines were represented at the recent Lithium Battery Multidisciplinary Meeting. He acknowledged that outreach and enforcement of existing regulations were a key to reducing risk and the likelihood of incidents and supported ICAO's efforts to address the need for improved oversight and appropriate enforcement. He argued that although additional restrictions would not improve compliance of those shippers who intentionally violated current regulations, it would place an unnecessary burden on those that did comply. He strongly urged the working group to consider enhancing packaging requirements over imposing restrictions on transport aboard aircraft and suggested that the robust packaging used by the medical device community be considered.

3.5.6.12.2 The Secretary stressed that there was increasing pressure from the ANC for the amount of industry involvement at DGP meetings to be minimized, as there were concerns with the potential for industry needs to eclipse safety needs. She noted that other ICAO panels did not have the level of industry involvement that the DGP did, and explained that panel members were normally expected to coordinate with all applicable disciplines within their States and to bring that information to the panel. Some expressed concern that ICAO would limit participation at DGP meetings as it was believed input from all disciplines involved was necessary for the development of safe regulations which could be feasibly implemented. Participation also provided a mechanism for everyone to keep abreast with changing regulations which was a benefit to safety.

3.5.6.13 Recent Lithium Battery Investigations (DGP-WG/14-IP/7)

3.5.6.13.1 The working group was informed of a recent investigation involving a retailer who was selling lithium ion batteries which had been deliberately mislabelled with a lower watt hour rating. An outer label indicated a Watt-hour rating of 99.9 Wh which concealed another label with an indication of a Watt-hour rating of 275 Wh. The batteries were being sold for remotely piloted aircraft systems (RPAS). It was believed that the purpose of the relabeling was to allow for the carriage of the battery by the final purchaser under the passenger provisions of Part 8 without having to seek the operator approval normally

required for batteries exceeding a Watt-hour rating of 100 Wh (but not exceeding 160 Wh). There was insufficient evidence to place blame on the retailer who alleged receiving the mislabelled batteries from overseas. The matter would be referred to the State of alleged Origin.

3.5.6.13.2 The working group was also informed of a separate investigation involving the carriage of significant quantities of lithium ion batteries which were involved in a fire in an aircraft cargo hold while the aircraft was on the ground.

3.5.6.13.3 The panel member outlined some of the steps his State was taking to prevent such incidents from occurring. These included:

- a) a campaign to raise awareness with import and law enforcement agencies in a position to detect variances which could indicate non-compliance; and
- b) a separate campaign focusing on RPAS operators, recognizing that this was an emerging area of aviation that needed safety education and research.

3.5.6.13.4 He noted that in accordance with the Part 8 provisions, batteries carried by passengers exceeding a Watt-hour rating of 100 Wh but not exceeding 160 Wh required operator approval. One of the conditions for carrying such batteries was that they must be of the type to have passed UN testing requirements, but how an operator could ascertain if this condition was met was questioned. He noted difficulties within his own State authority with obtaining evidence that certain batteries from certain manufacturers or distributors met the testing requirements and that this was due in large part to businesses where batteries were sold under a white label arrangement for relabeling and wholesaling.

3.5.6.13.5 Other panel members and observers indicated similar problems within their States/industries. How to demonstrate proof of compliance with UN testing requirements had been raised during discussions on a working paper related to compliance (see paragraph 3.5.6.5 of this report). It was noted that this was a difficulty that would apply to all modes of transport and suggested that the issue be raised at the UN Sub-Committee.

3.6 Agenda Item 6: Resolution, where possible, of the non-recurrent work items identified by Air Navigation Commission or the Dangerous Goods Panel

3.6.1 Agenda Item 6.1: Dangerous incident and accident data collection

3.6.1.1 Guidance Material on Reporting of Dangerous Goods Occurrence (DGP-WG/14-WP/13 (Revised))

3.6.1.1.1 The complexity of reporting requirements in Annex 18 and the Technical Instructions had been raised at previous DGP meetings and there had been support for the development of guidance material on the subject at DGP/24. Accordingly, a draft guidance document was developed and presented to the working group. The document provided guidance to States and to operators on how to fulfil their dangerous goods reporting requirements.

3.6.1.1.2 The working group expressed its appreciation for the work done and reiterated the need for some form of guidance material. Some felt that the material presented would be a little too detailed for many States which did not have even basic reporting systems in place. The document focused on the operator's reporting requirements, but it was noted that Part 1;7 contained a recommendation for entities

other than operators to follow the reporting requirements of Part 7 when they were in possession of dangerous goods at the time a dangerous goods accident or incident occurred or when they discovered undeclared or misdeclared dangerous goods. It was suggested that consideration be given to whether or not this recommendation should be upgraded to a mandatory requirement.

3.6.1.1.3 Work on the guidance document would continue through an ad hoc working group on reporting. The group would also take efforts to address the issues raised in DGP-WG/14-WP/29 (see paragraph 3.1.1 of this report) and on the ICAO dangerous goods incident and accident reporting system (see paragraph 3.6.1.2 below).

3.6.1.2 Dangerous Goods Coordinated Oversight Programme: The Progress of Dangerous Goods Occurrence Report System (DGP-WG/14-IP/3)

3.6.1.2.1 The working group was given a progress report on the creation of a dangerous goods occurrence reporting system intended for Regional Safety Oversight Cooperation System (SRVSOP) member States. The working group was informed that the SRVSOP was a regional organization for safety oversight (RSOO) established in 1998 through the signing of a Memorandum of Understanding between ICAO and the Latin American Civil Aviation Commission (LACAC).

3.6.1.2.2 The initiation of the project was prompted by the recognition that not all States had effective reporting systems and those that did were not always willing to share information with other States. There was also no standard way for States to manage and control reports received. This resulted in scattered data from States, making it difficult to analyze safety trends outside of one State. The goal of the system was therefore to have a centralized repository for all States to report and share information.

3.6.1.2.3 One of the main concerns in developing the system was how to deal with confidential data. Recognizing that the purpose of the system was to cultivate a learning environment and not to be an enforcement tool, it was developed so that information such as the name of the shipper and the operator would not be accepted. Reports would not be published unless they had first been verified by the SRVSOP as an additional step to ensuring confidentiality.

3.6.1.2.4 The working group was provided information on the reporting procedure, the type of data that the system would collect, and a draft of the system user interface. It was expected that the system would be functional in early 2015. Tests would be run and the results obtained would be presented to the DGP Working Group of the Whole in 2015. It was noted that use of the system would not be restricted to SRVSOP member States and that all States were invited to participate or provide suggestions for improvements.

3.6.1.2.5 The working group expressed its appreciation for the work done and recognized the benefits the system would provide to the region. It was hoped that the system could be used as a basis for the ICAO dangerous goods incident and accident reporting system (see paragraph 3.6.1.1 above).

3.6.2 Agenda Item 6.2: Development of guidance material on countering the potential use of dangerous goods in an act of unlawful interference

3.6.2.1 No working papers were presented on this agenda item.

3.6.3 Agenda Item 6.3: Development of competency-based training provisions for dangerous goods

3.6.3.1 Competency-Based Training For Dangerous Goods Personnel (DGP-WG/14-WP/1)

3.6.3.1.1 Draft guidance material developed by the DGP Working Group on Training along with draft amendments to Table 1-4 of the Technical Instructions were presented to the working group. The guidance material provided background information on competency-based training and how it was used to develop competency frameworks for dangerous goods personnel. The training working group recommended, as a first step, including the guidance material as a new attachment in the 2017-2018 Edition of the Technical Instructions and to consider also providing the material on the ICAO public website. This would provide the opportunity for States and industry to become familiar with the new provisions and to provide feedback before the panel considered making any of the material mandatory.

3.6.3.1.2 The working group was reminded of competency frameworks that had been developed at DGP/23 for shippers, freight forwarders and State employees. Since that time, the training working group began developing a competency framework for operators. One of the difficulties the training group had in developing the framework was in understanding the relationship between the function-driven approach needed for competency-based training and the subject matter-driven approach used in Tables 1-4, 1-5 and 1-6 of the Technical Instructions. The training group also recognized that certain functions performed by operators could be performed by other dangerous goods personnel (other than State employees) and vice versa. This led to the decision to take a different approach to developing the frameworks. By mapping out dangerous goods functions through the use of flowcharts, the training group was able to merge all dangerous goods functions into one framework. Based on this framework, the group redesigned Table 1-4 to be function rather than subject-matter based. It was stressed that the values provided in the revised table were sample data and not final text. Work on finalizing the tables would continue if the working group agreed to the approach taken in principle. Subject to the agreement of the working group of the whole, further amendments to Part 1;4 would also be considered.

3.6.3.1.3 It was recalled that a separate framework for State employees involved in the regulation and oversight of the transport of dangerous goods by air had been approved at DGP/23 (see paragraph 5.7.1 of the DGP/23 Report). The training working group saw the need to revise this framework based on the lessons learned in developing the framework for dangerous goods personnel. As such, a draft revised framework was provided to the meeting for information. The working group on training would finalize the framework before the next meeting of the DGP Working Group of the Whole. The framework would be incorporated into the Supplement to the Technical Instructions.

3.6.3.1.4 The guidance material was welcomed by the working group. It was recognized that the material would be an invaluable tool for the development of competency-based training programmes. Some members felt that developing training programmes based on the competency-based frameworks would make Tables 1-4 and 1-5 obsolete and that they could therefore be deleted. It was recognized, however, that removing the tables would be a drastic change which industry might not be ready for. The function-based approach taken to revise Table 1-4 was supported; the training working group would finalize amendments to Tables 1-4 and 1-5 before DGP-WG/15 with the intent of including them in the new attachment to the Technical Instructions as a transitional measure.

3.6.3.1.5 The need for further amendments to Part 1;4 was agreed. The provisions would need to reflect the competency-based approach. It was noted that the current assessment requirements focused on a test to verify understanding. The need to incorporate competency-based assessment into the provisions would need to be considered, recognizing that determining whether someone could perform a function

might be difficult, particularly when training was not provided at a work place. Guidance material on assessment would therefore be necessary.

3.6.3.1.6 One member suggested that there were some categories of personnel not adequately addressed in the new framework, notably flight crews, cabin crews and dispatchers. He suggested that the group identify which competencies were expected from them and to ensure these were reflected in the framework. Adding an additional competency unit was suggested as something that should be considered.

3.6.3.1.7 The importance of recognizing that varying degrees of subject matter knowledge was necessary depending on the functions performed and that this should be reflected in the guidance material was stressed. One member reported on frameworks in his State whereby details of knowledge required for each performance criteria were provided and suggested the same should be considered for the dangerous goods competency frameworks.

3.6.3.1.8 Several members expressed that implementing competency-based training would not be an onerous task for companies providing in-house training for specific groups of personnel. However, the task of providing competency-based training to a mixture of personnel and/or to personnel from various companies, which was often the case when training was provided by external training organizations, would potentially be a complex task. The importance of effective guidance material would be essential to overcoming difficulties as would be the need for a transition period.

3.6.3.1.9 It was noted that knowledge of passenger provisions had been assigned to every category of dangerous goods personnel in the current tables of Part 1;4, despite the fact that not every category of personnel performed functions related to this subject matter. This had been seen as an opportunity to provide outreach on what passengers can and cannot bring on an aircraft, recognizing the potential for all dangerous goods employees to be passengers. Whether or not including this in a competency-based training programme was appropriate would need to be considered.

3.6.3.1.10 There was strong support for issuing the guidance material, competency-base frameworks for dangerous goods personnel and amendments to Part 1;4 in an attachment to the Technical Instructions and for providing it on the ICAO public website as a transitional measure. Exposing the information to training providers and providing a mechanism for them to provide feedback would be an essential step to ensuring the feasibility of mandating the provisions. The Secretary suggested that ICAO issue an e-bulletin to member States advising of the material on the website in an attempt to provide greater exposure.

3.6.4 Agenda Item 6.4: Consideration of transitional measures for amendments to the Technical Instructions

3.6.4.1 Transition Period (DGP-WG/14-WP/6)

3.6.4.1.1 The working group was asked to agree to an amendment allowing for a transitional period of six months before new editions of the Technical Instructions became mandatory. It was noted that other international regulations allowed for transitional periods. A transition period for the Technical Instructions would facilitate the timely incorporation of new regulations into computerized dangerous goods systems and allow for effective training of dangerous goods personnel on the new requirements. It was suggested that a transition period would also prevent potential delays in acceptance which could occur when dangerous goods consignments were prepared at the end of the applicability period of one edition of the Technical Instructions but end up in the transport train at the beginning of an applicability period for the next edition.

3.6.4.1.2 It was argued that transition periods had been allowed for specific provisions in the Technical Instructions in the past, such as the reformatted packing instructions introduced in the 2009-2010 Edition of the Instructions, and that no problems along the transport chain were encountered.

3.6.4.1.3 There was some support for the proposal, especially from members from States which depended on the non-English versions of the Instructions. These versions of the Technical Instructions were normally published three months after the English version, making it difficult to incorporate the new provisions in training programmes and to implement them in time for a 1 January applicability date. Some supported a transition period in principle, but felt that six months was too long. A shorter transition period combined with earlier publication of the Technical Instructions was suggested or, if an earlier publication date was not possible, for the revisions to the Instructions to be made available on the public website.

3.6.4.1.4 Several members did not support the proposal as written. Although transition periods were provided for other modes of transport, the air mode was the only one that required acceptance checks. Having two sets of regulations for six months would create difficulties for operators performing acceptance checks. Some expressed support for a transition period on a case-by-case basis, recognizing that this made sense for certain changes to the Technical Instructions such as changes to proper shipping names.

3.6.4.1.5 All agreed that many of the changes to the Instructions were safety based and that a transition period should not apply to such changes.

3.6.4.1.6 The Secretary noted that the ANC had expressed concern with the ability of States to implement changes to the Technical Instructions before the applicability date, recognizing the short time period between Council approval of new provisions, the date they are published and the date they become applicable. The Secretary reminded the working group that DGP/24 had agreed to add a permanent agenda item on this subject to panel meeting agendas so that efforts could be made at each meeting to determine if there were any new provisions for which a transition period could be applied.

3.6.4.1.7 A working group through correspondence would be established to develop a new proposal based on the comments received.

3.7 **Agenda Item 7: Other business**

3.7.1 **Terminology for Authorization for Operators to Carry Dangerous Goods (DGP-WG/14-WP/12)**

3.7.1.1 Clarification was sought on the use of the word “approval” and “authorization” in Annexes 6 and 18:

- a) Amendment 38 to Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes* introduced a new Chapter 14 and a new Attachment K on dangerous goods. While the new material referred to the authorization for operators to carry dangerous goods as an operational “approval”, the operations specifications layout in Appendix 6 to Annex 6 referred to a special “authorization”.
- b) The definition for approval in Annex 18 related to provisions for the transport of dangerous goods normally forbidden on an aircraft while the intent of approval in Annex 6 related to an over-all authorization for an operator to carry dangerous.

- c) Annex 6 also referred to specific approvals in the operations specifications. It was suggested that this would be to allow for the transport of specific types of dangerous goods only such as dry ice, biological substance, Category B, dangerous goods in excepted quantities, and the transport of operator material (COMAT) classified as dangerous goods.

3.7.1.2 It was suggested that the inconsistent use of the terms “approval” and “authorization” caused confusion. The working group was invited to consider whether an amendment to Annex 6 to replace the word “approval” with “authorization” was appropriate.

3.7.1.3 The working group was advised that the subject had been raised during discussions with members of the Operations Panel (OPSP) when the amendments introducing the dangerous goods requirements into Annex 6 were being considered, but that OPSP members were persistent in their views of maintaining the terminology included in Amendment 38 to Annex 6. Some panel members acknowledged that both terms were used in their national regulations and that changing the terminology would add further complications for them. The addition of cross references in the dangerous goods documents to clarify the use of the terms was suggested.

3.7.1.4 The Secretary noted that the ANC had raised the issue during their review of Amendment 38 and asked that an ANC job card on consistent use of the terms “authorization” and “approval” be developed. She would keep the DGP informed of the progress and agreed that cross references in Annex 18 be considered as a short-term solution.

3.7.2 Acceptance of Mail through Extra-Territorial Offices of Exchange (DGP-WG/14-WP/30)

3.7.2.1 Three reports of incidents involving fire from lithium batteries in the mail were reported. Significant quantities of lithium batteries and other dangerous goods detected in the airmail were also reported. This was despite recent changes in the Technical Instructions mandating State oversight of designated postal operator’s (DPO) dangerous goods training programmes and procedures for controlling the introduction of dangerous goods in airmail. Two of the fire incidents involved lithium batteries from entities described as extra-territorial offices of exchange (ETOE). ETOEs were described as designated operators operating in the territory of another country. There were also non-designated operators operating international mail processing centres (IMPCs). Concerns related to the lack of oversight by the States these entities operated in and by the lack of approval by that State’s CAA for the entity to operate within the State were raised. There was also a lack of consistency in how the entities were treated from State to State. Some DPOs allowed ETOEs to use their Universal Postal Union (UPU) documentation suggesting that these ETOEs were considered extensions of the national postal authority. Others did not.

3.7.2.2 The concerns raised in the working paper were shared by several members. One member explained that mail received from ETOEs was considered cargo in his State and not mail. This had been the policy in another State as well, but this had become impractical due to the expense involved. Other members stated that ETOEs were considered freight forwarders in their States. There were concerns with not knowing if ETOEs existed in a particular State and if so how many. A representative of the UPU who was not present at the meeting but who was in communication with the Secretary suggested the possibility of providing CAAs with a web-based tool to determine what ETOEs existed in their States.

3.7.2.3 The UPU representative stressed that his organization was also concerned with the issues surrounding ETOEs and discussions were ongoing. He explained that items sent from ETOEs were considered commercial items not subject to the UPU Acts unless the destination postal administration announced a policy to apply the Acts to the items received from ETOEs. Items tendered by ETOEs were

treated according to the national policy of the destination country and were technically subject to the national policies of origin and destination.

3.7.2.4 Some members felt that the issue of ETOEs was a threat to safety and supported the inclusion of guidance in the form of a note in Part 1;2.3. Others felt that this would be premature on the basis that the UPU was still discussing the issue.

3.7.2.5 It was suggested that the Secretary bring the issue to the attention of the Aviation Security Panel (AVSECP) recognizing that there were different levels of security in relation to mail versus cargo.

3.7.2.6 The working group agreed that a joint DGP-UPU working group be established. The intent was to have a small meeting in December when several members would be attending the Forty-sixth Session of the UN Sub-Committee. It was noted that this was a multimodal issue and that this should be stressed to the UPU.

3.7.3 **Ebola Virus Disease (EVD) (DGP-WG/14-WP/31)**

3.7.3.1 Questions related to the transport of persons infected or suspected to be infected with the Ebola virus had been raised during the Ebola virus outbreak that was occurring in West Africa. It was noted that the Technical Instructions provided for the transport of Ebola virus as a Category A infectious substance assigned to UN 2814 — **Infectious substance, affecting humans**. The Instructions did not, however, provide specific requirements for the transport of patients or deceased persons known to be or suspected to be infected with Ebola. Although air ambulance services had been used to transport patients known to be infected with Ebola during the current outbreak, questions had been raised as to whether approvals were required for such transport and if so, by whom. Recognizing that Annex 18 prohibited the transport of infected live animals without an exemption, noting that these animals had been deliberately infected, additional concerns had been raised as to whether a similar exemption process should be required for humans. Whether or not deceased persons known to be or suspected of being infected with Ebola virus could be transported had also been raised, noting that information from the World Health Organization (WHO) suggested that the virus could survive in corpses for days or possibly weeks. The working group was asked to seek guidance from public health authorities in their State and to report back to the working group with the intent of developing guidance on the subject.

3.7.3.2 The working group strongly recommended against the international transport of deceased persons known or suspected of being infected with Ebola virus unless the body had been cremated, noting that the exemption process could be considered if necessary. With regard to whether or not humans known to be infected with Ebola should be subject to the same prohibition as infected live animals, the working group agreed that transporting infected humans would not fall under the purview of Annex 18 and should therefore not be subject to the same prohibitions as infected live animals. It was agreed that the need to transport patients infected with Ebola by air ambulance should be coordinated and determined by State health authorities in collaboration with civil aviation authorities if necessary.

APPENDIX A

CONSOLIDATION OF AMENDMENTS TO THE TECHNICAL INSTRUCTIONS AGREED AT
DGP-WG/14

Part 3

DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND
LIMITED AND EXCEPTED QUANTITIES

...

Table 3-1. Dangerous Goods List

DGP-WG/14-WP/5 (see paragraph 3.2.4.1 of this report):

| Name | UN No. | Class or division | Subsidiary risk | State variations | Special provisions | UN packing group | Excepted quantity | Passenger and cargo aircraft | | Cargo aircraft | |
|--|--------|-------------------|-----------------|--------------------------------------|---------------------|------------------|-------------------|--|-------------------------------|------------------------|-------------------------------|
| | | | | | | | | Packing instruction | Max. net quantity per package | Packing instruction | Max. net quantity per package |
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| ... | | | | | | | | | | | |
| Aerosols, non-flammable | 1950 | 2.2 | | | A98 A145 A167 | | E0 | 203 -or-204 Y 203 -or- Y 204 | 75 kg 30 kg G | 203 -or-204 | 150 kg |
| ... | | | | | | | | | | | |
| Aerosols, non-flammable (tear gas devices) | 1950 | 2.2 | 6.1 | AU 1 CA 7 IR 3 NL 1 US 3 | A1 A145 A167 | | E0 | FORBI | DDEN | 212 203 | 50 kg |

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Chapter 3

SPECIAL PROVISIONS

...

Table 3-2. Special provisions

DGP-WG/14-WP/11 (see paragraph 3.2.7.2 of this report):

| <i>TIs</i> | <i>UN</i> |
|------------|-----------|
|------------|-----------|

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|-----|---|
| A70 | Internal combustion or fuel cell engines being shipped either separately or incorporated into a vehicle, machine or other apparatus, without batteries or other dangerous goods, are not subject to these Instructions when carried as cargo provided that: |
|-----|---|

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Multiple engines may be shipped in a unit load device or ~~other type of pallet~~ provided that the shipper has made prior arrangements with the operator(s) for each shipment.

When this special provision is used, the words "not restricted" and the special provision number A70 must be provided on the air waybill when an air waybill is issued.

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|------|---|
| A151 | When dry ice is used as a refrigerant for other than dangerous goods loaded in a unit load device or other type of pallet , the quantity limits per package shown in columns 11 and 13 of Table 3-1 for dry ice do not apply. In such case, the unit load device or other type of pallet must be identified to the operator and must allow the venting of the carbon dioxide gas to prevent a dangerous build-up of pressure. |
|------|---|

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Part 4**PACKING INSTRUCTIONS**

...

Chapter 4**CLASS 2 — GASES***Parts of this Chapter are affected by State Variations CA 17, US 6, US 15; see Table A-1*

...

DGP-WG/14-WP/5 (see paragraph 3.2.4.1 of this report):

Packing Instruction 203

Passenger and cargo aircraft for UN 1950 and 2037 only

The general packing requirements of 4;1 must be met.

For the purposes of this packing instruction, a receptacle is considered to be an inner packaging.

*Note.— “Receptacle” has the same meaning as set out in 1;3. Any reference in this packing instruction to receptacle will include “aerosols” of UN 1950 and “receptacles, small, containing gas” and “gas cartridges” of UN 2037.***Metal aerosols (IP.7, IP.7A, IP.7B) and non-refillable receptacles containing gas (gas cartridges)**

Non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) must not exceed 1 000 mL capacity.

The following conditions must be met:

- a) the pressure in the receptacle must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;
- b) if the pressure in the receptacle exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;
- c) if the pressure in the receptacle exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;
- d) if the pressure in the receptacle exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;
- e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule for an aerosol. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into the outer metal receptacle;
- f) the liquid content must not completely fill the closed receptacle at 55°C;
- g) each receptacle exceeding 120 mL capacity must have been heated until the pressure in the receptacle is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect. **For aerosols, non-flammable (tear gas devices) this heat test applies to all aerosols regardless of their capacity.**

Plastic aerosols (IP.7C)Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of these ~~se~~ Technical Instructions, in which case the quantity must not exceed 500 mL.

The following conditions must be met:

- a) the contents must not completely fill the closed receptacle at 55°C;
- b) the pressure in the receptacle may not exceed 970 kPa at 55°C; and
- c) each receptacle must be leak tested in accordance with the provisions of 6;3.2.8.1.6.

Non-flammable aerosols containing medical preparations or biological products

Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:

- a) the pressure in the aerosol must not exceed 970 kPa at 55°C;
- b) the liquid contents must not completely fill the closed receptacle at 55°C;
- c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;
- d) the valves must be protected by a cap or other suitable means during transport.

| <u>UN number and name</u> | <u>Net quantity per package</u> | |
|--|---------------------------------|---------------|
| | <u>Passenger</u> | <u>Cargo</u> |
| <u>UN 1950 Aerosols, flammable</u> | <u>75 kg</u> | <u>150 kg</u> |
| <u>UN 1950 Aerosols, flammable (engine starting fluid)</u> | <u>Forbidden</u> | <u>150 kg</u> |
| <u>UN 1950 Aerosols, non-flammable</u> | <u>75 kg</u> | <u>150 kg</u> |
| <u>UN 1950 Aerosols, non-flammable (tear gas devices)</u> | <u>Forbidden</u> | <u>50 kg</u> |

ADDITIONAL PACKING REQUIREMENTS

- Packagings must meet Packing Group II performance requirements.
- Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents during normal conditions of air transport.
- Receptacles must be tightly packed, so as to prevent movement.

UN 1950 Aerosols, non-flammable (tear gas devices) – Cargo Aircraft Only

- Only metal receptacles, IP.7, IP.7A, IP.7B are permitted. The aerosols must be individually placed into spiral wound tubes fitted with metal ends or a double-faced fibreboard box with suitable padding before being packed into the outer packaging.

OUTER PACKAGINGS (see 6;3.1)

Boxes

Aluminium (4B)
Fibreboard (4G)
Natural wood (4C1, 4C2)
Other metal (4N)
Plastics (4H1, 4H2)
Plywood (4D)
Reconstituted wood (4F)
Steel (4A)

Drums

Aluminium (1B2)
Fibre (1G)
Other metal (1N2)
Plastics (1H2)
Plywood (1D)
Steel (1A2)

Packing Instruction Y203

Passenger and cargo aircraft for UN 1950 and 2037 only

The requirements of 3;4 must be met.

For the purposes of this packing instruction, a receptacle is considered to be an inner packaging.

Note.— “Receptacle” has the same meaning as set out in 1;3. Any reference in this packing instruction to receptacle will include “aerosols” of UN 1950 and “receptacles, small, containing gas” and “gas cartridges” of UN 2037.

Metal aerosols (IP.7, IP.7A, IP.7B) and non-refillable receptacles containing gas (gas cartridges)

Non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) containing toxic substances must not exceed 120 mL capacity.

All other non-refillable metal aerosols and non-refillable receptacles containing gas (gas cartridges) must not exceed 1 000 mL capacity.

The following conditions must be met:

- a) the pressure in the receptacle must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;
- b) if the pressure in the receptacle exceeds 970 kPa at 55°C but does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;
- c) if the pressure in the receptacle exceeds 1 105 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;
- d) if the pressure in the receptacle exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;
- e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule for an aerosol. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into the outer metal receptacle;
- f) the liquid content must not completely fill the closed receptacle at 55°C;
- g) each receptacle exceeding 120 mL capacity must have been heated until the pressure in the receptacle is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect.

Plastic aerosols (IP.7C)

Non-refillable plastic aerosols must not exceed 120 mL capacity, except when the propellant is a non-flammable, non-toxic gas and the contents are not dangerous goods in accordance with the provisions of ~~the Technical~~ these Instructions, in which case the quantity must not exceed 500 mL.

The following conditions must be met:

- a) the contents must not completely fill the closed receptacle at 55°C;
- b) the pressure in the receptacle may not exceed 970 kPa at 55°C; and
- c) each receptacle must be leak tested in accordance with the provisions of 6;3.2.8.1.6.

Non-flammable aerosols containing medical preparations or biological products

Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:

- a) the pressure in the aerosol must not exceed 970 kPa at 55°C;
- b) the liquid contents must not completely fill the closed receptacle at 55°C;
- c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;
- d) the valves must be protected by a cap or other suitable means during transport.

ADDITIONAL PACKING REQUIREMENTS

- Release valves on aerosols must be protected by a cap or other suitable means to prevent inadvertent release of the contents during normal conditions of air transport.
- Receptacles must be tightly packed, so as to prevent movement.

OUTER PACKAGINGS (see 6;3.1)*Boxes*

Aluminium
 Fibreboard
 Natural wood
 Other metal
 Plastics
 Plywood
 Reconstituted wood
 Steel

Drums

Aluminium
 Fibre
 Other metal
 Plastics
 Plywood
 Steel

Packing Instruction 204

The general packing requirements of 4;1 must be met.

~~Aerosols, non flammable, containing biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:~~

- ~~— a) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~
- ~~— b) the liquid contents must not completely fill the closed receptacle at 55°C;~~
- ~~— c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;~~
- ~~— d) the valves must be protected by a cap or other suitable means during transport;~~
- ~~— e) aerosols must be tightly packed, so as to prevent movement, in wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or plastic boxes (4H1, 4H2) of Packing Group II.~~

Packing Instruction Y204

The requirements of 3.4 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

INNER:

~~Aerosols, non-flammable, containing only a non-toxic substance or substances and biological products or a medical preparation which will be deteriorated by a heat test, are acceptable in inner non-refillable receptacles not exceeding 575 mL capacity each, providing all the following conditions are met:~~

- ~~— a) the pressure in the aerosol must not exceed 970 kPa at 55°C;~~
- ~~— b) the liquid contents must not completely fill the closed receptacle at 55°C;~~
- ~~— c) one aerosol out of each lot of 500 or less must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;~~
- ~~— d) the valves must be protected by a cap or other suitable means during transport;~~
- ~~— e) aerosols must be tightly packed, so as to prevent movement, in one of the following boxes:~~

OUTER:

Boxes

- ~~— Fibreboard~~
- ~~— Plastics~~
- ~~— Plywood~~
- ~~— Reconstituted wood~~
- ~~— Wooden~~

...

Packing Instruction 212

The general packing requirements of 4;1 must be met.

~~Aerosols, non-flammable, which are tear gas devices are permitted in inner non-refillable metal receptacles not exceeding 1 000 mL capacity each providing all the following conditions are met:~~

- ~~a) the pressure in the aerosol must not exceed 1 500 kPa at 55°C and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C;~~
- ~~b) if the pressure in the aerosol does not exceed 1 105 kPa at 55°C, an IP.7, IP.7A or IP.7B metal receptacle must be used;~~
- ~~c) if the pressure in the aerosol exceeds 1 105 kPa at 55°C but does not exceed 1 245 kPa at 55°C, an IP.7A or IP.7B metal receptacle must be used;~~
- ~~d) if the pressure in the aerosol exceeds 1 245 kPa at 55°C, an IP.7B metal receptacle must be used;~~
- ~~e) IP.7B metal receptacles having a minimum burst pressure of 1 800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated in a), b), c) or d) do not apply to the pressure within the capsule. The quantity of gas contained in the capsule must be so limited such that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into an aerosol;~~
- ~~f) the liquid content must not completely fill the closed receptacle at 55°C;~~
- ~~g) each aerosol must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C, without evidence of leakage, distortion or other defect;~~
- ~~h) the valves must be protected by a cap or other suitable means during transport;~~
- ~~i) aerosols must be individually placed into spiral wound tubes fitted with metal ends or a double-faced fibreboard box with suitable padding, which must be tightly packed in wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fibreboard boxes (4G) or plastic boxes (4H1, 4H2) of Packing Group II. Maximum net quantity per package is 50 kg.~~

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

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DGP-WG/14-WP/11 (see paragraph 3.2.7.2 of this report):

Packing Instruction 954

Passenger and cargo aircraft for UN 1845 only

...

Dry ice used for other than dangerous goods may be shipped in a unit load device ~~or other type of pallet~~ prepared by a single shipper provided that:

- a) the shipper has made prior arrangements with the operator;
- b) the unit load device, ~~or other type of pallet~~, must allow the venting of the carbon dioxide gas to prevent a dangerous build-up of pressure (the marking requirements of 5;2 and the labelling requirements of 5;3 do not apply to the unit load device); and
- c) the shipper must provide the operator with written documentation or, where agreed with the operator, information by EDP or EDI techniques, stating the total quantity of the dry ice contained in the unit load device ~~or other type of pallet~~.

...

Packing Instruction Y963

Passenger and cargo aircraft for ID 8000 only

Consumer commodities are materials that are packaged and distributed in a form intended or suitable for retail sale for the purposes of personal care or household use. These include items administered or sold to patients by doctors or medical administrations. Except as otherwise provided below, dangerous goods packed in accordance with this packing instruction do not need to comply with 4.1 or Part 6 of these Instructions; they must, however, comply with all other applicable requirements.

...

- k) Consumer commodities shipped according to these provisions may be shipped in a unit load device ~~or other type of pallet~~ prepared by a single shipper provided they contain no other dangerous goods. The shipper must provide the operator with written documentation stating the number of packages of consumer commodities contained in each unit load device ~~or other type of pallet~~.

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Part 7

OPERATOR'S RESPONSIBILITIES

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DGP-WG/14-WP/11 (see paragraph 3.2.7.2 of this report):

Chapter 1

ACCEPTANCE PROCEDURES

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1.2 ACCEPTANCE OF DANGEROUS GOODS BY OPERATORS

1.2.1 An operator must not accept for transport aboard an aircraft a package or overpack containing dangerous goods or a freight container containing radioactive material or a unit load device ~~or other type of pallet~~ containing the dangerous goods as described in 1.4.1 b) and c) unless:

- a) it is accompanied by two copies of the dangerous goods transport document; or
- b) the information applicable to the consignment is provided in electronic form; or
- c) it is accompanied, where permitted, by alternative documentation.

...

1.3 THE ACCEPTANCE CHECK

1.3.1 Before a consignment consisting of a package or overpack containing dangerous goods, a freight container containing radioactive material or a unit load device ~~or other type of pallet~~ containing dangerous goods as described in 1.4 is first accepted for carriage by air, the operator must, by use of a checklist, verify the following:

...

Note 1.— Minor discrepancies, such as the omission of dots and commas in the proper shipping name appearing on the transport document or on package markings, or minor variations in hazard labels which do not affect the obvious meaning of the label, are not considered as errors if they do not compromise safety and should not be considered as reason for rejecting a consignment.

Note 2.— Where packages are contained in an overpack or freight container, as permitted by 1.4, the checklist should establish the correct marking and labelling of such an overpack ~~or other type of pallet~~ or freight container and not the individual packages contained in them. Where packages are contained in a unit load device, as permitted by 1.4.1, the checklist should not require the checking of packages individually for the correct marking and labelling.

...

1.4 ACCEPTANCE OF FREIGHT CONTAINERS AND UNIT LOAD DEVICES

1.4.1 An operator must not accept from a shipper a freight container or a unit load device containing dangerous goods other than:

- a) a freight container for radioactive material (see 6;7.1);
- b) a unit load device ~~or other type of pallet~~ containing consumer commodities prepared according to Packing Instruction Y963;
- c) a unit load device ~~or other type of pallet~~ containing dry ice used as a refrigerant for other than dangerous goods prepared according to Packing Instruction 954; or
- d) a unit load device ~~or other type of pallet~~ containing magnetized material.

1.4.2 When an operator accepts a unit load device ~~or other type of pallet~~ containing consumer commodities or dry ice as permitted by 1.4.1, the operator must attach an identification tag as required by 2.8.1 to the unit load device.

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Chapter 2

STORAGE AND LOADING

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2.11 LOADING OF DRY ICE

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2.11.2 Where dry ice is contained in a unit load device ~~or other type of pallet~~ prepared by a single shipper in accordance with Packing Instruction 954 and the operator, after acceptance, adds additional dry ice, then the operator must ensure that the information provided to the pilot-in-command reflects that revised quantity of dry ice.

Note.— For arrangements between the shipper and operator see Packing Instruction 954.

...

Chapter 4

PROVISION OF INFORMATION

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4.1 INFORMATION TO THE PILOT-IN-COMMAND

4.1.1 As early as practicable before departure of the aircraft, but in no case later than when the aircraft moves under its own power, the operator of an aircraft in which dangerous goods are to be carried must:

...

4.1.1.1 Except as otherwise provided, the information required by 4.1.1 must include the following:

...

- f) the net quantity, or gross mass if applicable, of each package, except that this does not apply to radioactive material or other dangerous goods where the net quantity or gross mass is not required on the dangerous goods transport document (see 5;4.1.4) or, when applicable, alternative written documentation. For a consignment consisting of multiple packages containing dangerous goods bearing the same proper shipping name and UN number or ID number, only the total quantity and an indication of the quantity of the largest and smallest package at each loading location need to be provided. For unit load devices ~~or other types of pallets~~ containing consumer commodities accepted from a single shipper, the number of packages and the average gross mass need to be provided;

...

4.11 RETENTION OF DOCUMENTS OR INFORMATION

...

4.11.2 For each package or overpack containing dangerous goods or freight container containing radioactive material or unit load device ~~or other type of pallet~~ containing dangerous goods as described in 1.4 that was not accepted by an operator due to an error or omission by the shipper in packaging, labelling, marking or documentation, a copy of the documentation as well as the acceptance checklist (when this is in a form which requires physical completion) should be retained for a minimum period of three months after the completion of the acceptance checklist.

Note.— Where the documents are kept electronically or in a computer system, they should be capable of being reproduced in a printed manner.

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DGP-WG/14-WP/9 (see paragraph 3.2.7.1 of this report):

Chapter 5

PROVISIONS CONCERNING PASSENGERS AND CREW

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APPENDIX B

RECOMMENDATIONS DEVELOPED BY THE INTERNATIONAL MULTIDISCIPLINARY LITHIUM BATTERY TRANSPORT COORDINATION MEETING (SECOND MEETING, COLOGNE, GERMANY, 9 TO 11 SEPTEMBER 2014)

Recommendation 1/14 — Excepted Section II Cells/Batteries:

That current provisions to except Section II cells/batteries continue. However, measures should be taken to prohibit packages of such cells/batteries from being overpacked or consolidated.

In light of the most recent tests and findings, the meeting considered the carriage of lithium-ion batteries in both passenger and cargo aircraft and recommended the following:

Recommendation 2/14 — Performance Based Provision to Limit the Probability of Propagation of Thermal Runaway Between Cells:

That a performance based provision be developed that would limit the probability of propagation of thermal runaway between cells to an acceptable level of risk.

Recommendation 3/14 — State of Charge Level of All Cells:

That all lithium-ion cells for shipment be limited to a State of Charge of no more than 30% as an interim means to reduce the probability of propagation of thermal runaway between cells.

Recommendation 4/14 — Carriage of Lithium-ion Batteries on Passenger Aircraft (Near-term):

Where multiple cargo compartment types are available, that lithium batteries be carried in the cargo compartment with the greatest fire suppression capability.

Recommendation 5/14 — Carriage of Lithium Batteries on Cargo Aircraft (Near-term):

That based upon a risk assessment, lithium batteries be carried in the cargo compartment with the most appropriate fire mitigation capability. Alternatively, that shipments of lithium cells/batteries be carried in Class C cargo compartments or in locations where alternative fire suppression is available where feasible and appropriate.

Recommendation 6/14 — Fire Detection and Suppression Agent Accessibility in Class C Compartments (Near-term):

That a lithium battery fire be detected rapidly and suppression agent reach the fire rapidly regardless of the use of containers or pallets. This will require a re-assessment of current ULD and fire detection/suppression technologies.

Recommendation 7/14 — Use of Enhanced Containers and Fire Containment Covers in Class C Cargo Compartments (Near-term):

That, given recent tests, the carriage of lithium-ion batteries in enhanced containers or on pallets fitted with fire containment covers that inhibit the ability of the Class C fire suppression agent from reaching the fire be curtailed, pending further testing.

Recommendation 8/14 — Performance Based Packaging of Lithium Batteries:

That further research and testing be completed as soon as possible on packagings for lithium batteries, that may include the use of cooling agents such as gel packs as a means to add additional protective layers to mitigate the risks associated with the carriage of lithium batteries

Recommendation 9/14 — Equivalent Halon Replacement Extinguishing Agents (Long-term):

That any future replacements for Halon 1301 have an equivalent capability or better with respect to lithium battery fires and that consideration be given to amendments to the existing Minimum Performance Specifications (MPS) to take this into consideration.

Recommendation 10/14 — Best Practices in Mitigating the Risks Associated with Carriage of Lithium Batteries (Near-term):

That information concerning the best practices for the carriage of lithium batteries be published as soon as practicable, taking into consideration the guidance under development by IATA in this area.

Recommendation 11/14 — Research and Sharing Information Concerning the Management of Risks Associated with the Carriage of Lithium Batteries (Long-term):

That States and industry be encouraged to conduct research and share their results in respect of future methods to mitigate the risks associated with the carriage of lithium batteries on aircraft including performance based packaging; use of existing ULDs and any appropriate modifications to these devices; use of fire resistant covers and containers; and enhancements to fire/smoke detection devices.

Recommendation 12/14— New Aircraft Type Designs (Long-term):

That aircraft manufacturers together with regulators consider mitigating strategies for the carriage of lithium batteries in designing new aircraft types.

Recommendation 13/14 — Aircraft Limitations:

That the Original Equipment Manufacturers characterize the tolerance of their aircraft to temperature, pressure and any other known conditions originating in cargo compartments.

Recommendation 14/14 — Lithium Metal Button Cells:

That method be established to distinguish lithium metal button cells from other types of lithium metal cells.