



Lithium Batteries— Future Work

Workshop on Lithium Batteries

15-16 July 2015

Bangkok, Thailand

Future work

- “Excepted” batteries
- Improved hazard communication
- Performance-based standards
- Other UN changes
- Non-compliant shipments



“EXCEPTED” BATTERIES

Exceptions — Justified?

- Intended to be simple-to-use, standalone
- Small quantities for average shipper
- Complicated, ever-changing
- Diminishing differences between fully regulated and excepted diminishing
- Do current provisions address original intent of exceptions?
- Do they add risk?
- Effect on future performance-based standards

“Bulk” shipments

- Multiple shipments of excepted batteries placed in overpacks/unit load devices (ULD)
- Pilot-in-command not informed
- DGP-WG/15
 - Shipper prohibited from placing in ULD
 - Not more than four packages in overpack
- Future work on performance standards
- DGP/25

Offer separately

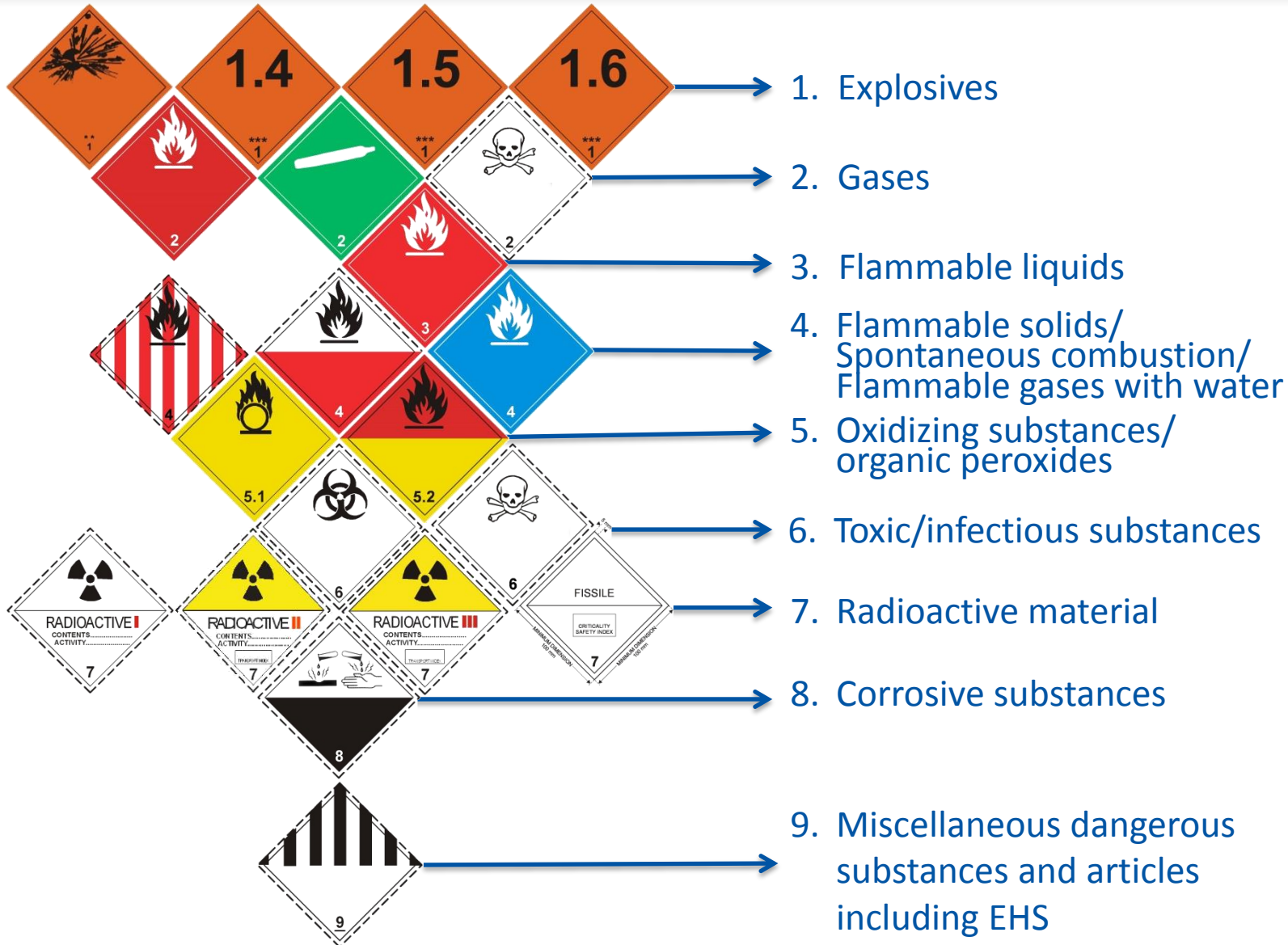
- Packages and overpacks of lithium ion batteries prepared in accordance with the provisions of Section II must be offered to the operator separately from cargo which is not subject to these Instructions and must not be loaded into a unit load device before being offered to the operator.

Overpacks

- [Not more than [four (4)] packages may be placed into an overpack and the overpack must not contain other packages containing dangerous goods]. When packages are placed in an overpack, the lithium battery handling label mark required by this packing instruction must either be clearly visible or the label mark must be affixed on the outside of the overpack and the overpack must be marked with the word “Overpack”.



IMPROVED HAZARD COMMUNICATION



Hazard Communication — Labels

Hazard Label for Class 9 — Miscellaneous (current requirement)



- Class 9 examples :
 - Environmentally hazardous substances
 - Magnetized material
 - Dry ice
 - **Lithium batteries**

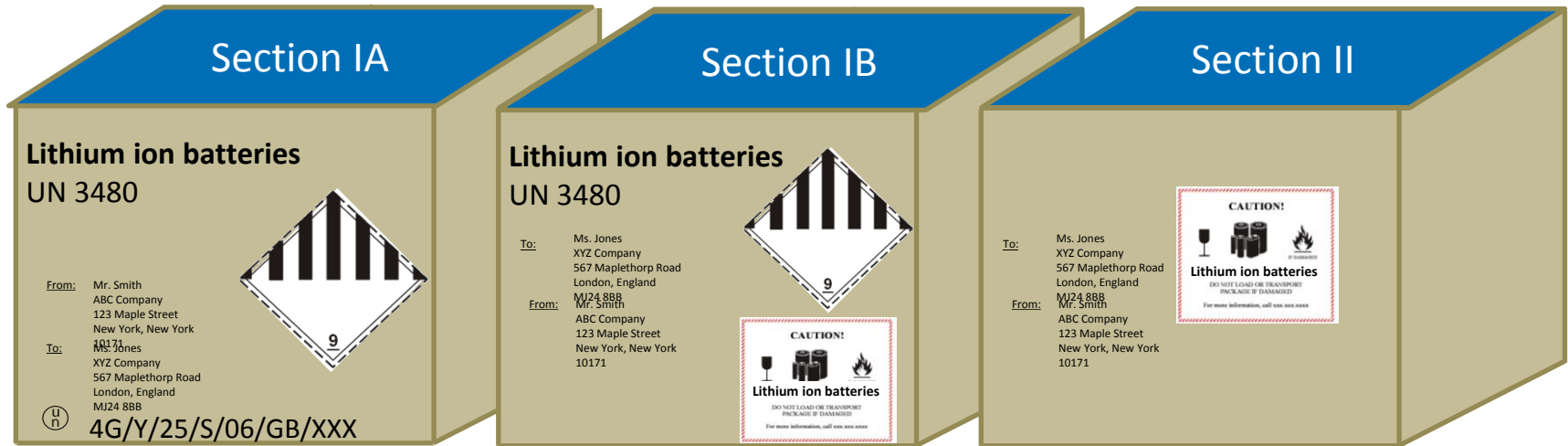
Lithium Battery Handling Label

(current requirement)



- Air mode only
- * = “Lithium ion battery” and/or “Lithium metal battery”

Labelling and Marking (current requirements)



	Section 1A	Section 1B	Section II	
Watt hours (cells)	> 20 Wh	≤ 20 Wh	≤ 20 Wh	
Watt hours (batteries)	> 100 Wh	≤ 100 Wh	≤ 100 Wh	
Quantity/package (passenger)	5 kg	10 kg	Watt-hour rating	Quantity
Quantity/package (cargo)	35 kg	10 kg	Cells or batteries ≤2.7 Wh	2.5 kg
			Cells > 2.7 Wh & ≤ 20 Wh	8 cells
			Batteries >2.7 Wh & ≤ 100 Wh	2 batteries

Lithium Batteries — New Label



- 19th revised edition of UN Model Regulations (2015)
- 2017-2018 Edition of Technical Instructions
- Transition period
 - 31 December 2018

Lithium Battery — New Mark



- All modes
- “Excepted” batteries
- 19th revised edition of UN Model Regulations (2015)
- 2017-2018 Edition of Technical Instructions
 - Replaces handling label
- Transition period
 - 31 December 2018
 - Air mode
 - Handling label or mark

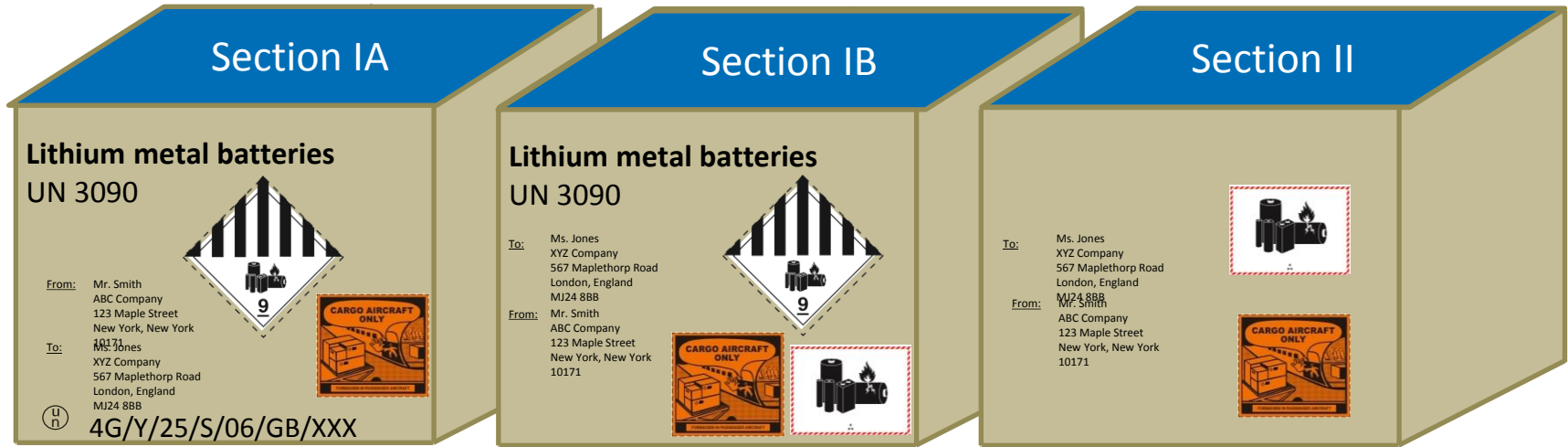
LB handling mark

- Each package must be ~~labelled~~ marked with a the appropriate lithium battery handling label mark (Figure ~~5-32~~ 5-3) in addition to the Class 9 hazard label.
- -
- *Note.— Figure 5-32 and the provisions for a lithium battery handling label as contained in the 2015-2016 Edition of these Instructions may continue to be used until 31 December 2018.*
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Consequential deletion?

- ~~Each consignment must be accompanied with a document with an indication that:~~
- ~~the package contains lithium ion cells or batteries;~~
- ~~the package must be handled with care and that a flammability hazard exists if the package is damaged;~~
- ~~special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and~~
- ~~a telephone number for additional information.~~
-
- ~~*Note. This information may be provided on the dangerous goods transport document.*~~

Labelling and Marking (new requirements)



	Section 1A	Section 1B	Section II								
Lithium content (cells)	> 1 g	≤ 1 g	≤ 1 g								
Lithium content (batteries)	>2 g	≤ 2 g	≤ 2 g								
Quantity/package (passenger)	Forbidden	Forbidden	Forbidden								
Quantity/package (cargo)	35 kg	2.5 kg	<table border="1"> <thead> <tr> <th>Lithium content</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>Cells or batteries ≤ 0.3 g</td> <td>2.5 kg</td> </tr> <tr> <td>Cells > 0.3 g and ≤ 1g</td> <td>8 cells</td> </tr> <tr> <td>Batteries >0.3 g and ≤ 2 g</td> <td>2 batteries</td> </tr> </tbody> </table>	Lithium content	Quantity	Cells or batteries ≤ 0.3 g	2.5 kg	Cells > 0.3 g and ≤ 1g	8 cells	Batteries >0.3 g and ≤ 2 g	2 batteries
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Batteries >0.3 g and ≤ 2 g	2 batteries										



PERFORMANCE-BASED STANDARDS

International Coordinating Council of Aerospace Industries (ICCAIA)

- “Fire protection capabilities and certification of original equipment manufacturers’ (OEMs) airframes and systems developed considering the carriage of general cargo and not the unique hazards associated with the carriage of dangerous goods, including lithium batteries.”
- Existing cargo compartment fire protection systems unable to suppress or extinguish fire involving significant quantities of lithium batteries
- Reduced time for safe flight and landing of an aircraft to a diversion airport.

ICCAIA/IFALPA Conclusions

- Action needed
 - Known and unknown risks
 - Continuously increasing volume requires action
- Stop transporting high density packages lithium ion on passenger aircraft until safer methods established
 - IFALPA
 - Stop on passenger AND cargo
- Establish appropriate packaging and shipping requirements

Multidisciplinary Effort

- Layered mitigation approach
 - Battery
 - Packaging
 - Cargo unit load device
 - Cargo compartment
 - Aircraft
- Multidisciplinary expertise
 - Dangerous goods
 - Operations
 - Airworthiness
- International Multidisciplinary Lithium Battery Transport Coordination Meetings (“Multidisciplinary Meeting”)

Multidisciplinary Meeting

(Montreal, 28 to 30 July 2015)

- Interim recommendations
 - Passenger aircraft ban
 - State of charge
 - Cargo loading controls
- Performance-based packaging
 - Containment of thermal runaway in package
 - External fuel fire requirement
 - Alternate means of compliance
- System safety assessment for cargo aircraft
- Recommendations for DGP/25
- Recommendations for other expert groups

All LB packing instructions

- A single cell battery as defined in Part III, sub-section 38.3.2.3 of the UN *Manual of Tests and Criteria* is considered a “cell” and must be transported according to the requirements for “cells” for the purpose of this packing instruction.

Restructuring Section II

- Lithium ion cells and batteries, when complying with Section II of this Packing Instruction, are only subject to the following additional provisions of these Instructions:
- -
- — Part 1;2.3 (General — Transport of dangerous goods by post);
- — Part 5;1.1 g) and j) (Shipper's responsibilities — General requirements);
- — Part 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents);
- — Part 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew); and
- — Paragraph 2 of this packing instruction.

Section II

- **II.2 Additional requirements**
- — Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong rigid outer packaging.
- — the package must be of such size that there is adequate space to affix the mark on one side without the mark being folded.

Potential ‘Equipment’

- For the purpose of this packing instruction, “equipment” means apparatus ~~requiring the lithium metal or lithium ion cells or batteries with which it is packed for its operation~~ for which the lithium cells or batteries will provide electrical power for its operation.



SAFETY PROMOTION

Safety Promotion

- Training and education
 - Commensurate with responsibilities
 - All entities handling lithium batteries
 - General public
- Communication
 - Risks
 - Safety-critical information
 - Mitigating measures
 - Why they are necessary



NON-COMPLIANT SHIPMENTS

Non Compliance

- **Deliberate non-compliance**
 - Counterfeit
 - Undeclared/misdeclared
- **Unintentional non-compliance**
 - Complicated regulations
- **Mitigation measures**
 - Simplified provisions
 - Awareness campaigns
 - Guidance material
 - Focused audits
- **Responsibility of battery industry**



ICAO

UNITING AVIATION



ICAO

North American
Central American
and Caribbean
(NACC) Office
Mexico City

South American
(SAM) Office
Lima

ICAO
Headquarters
Montréal

Western and
Central African
(WACAF) Office
Dakar

European and
North Atlantic
(EUR/NAT) Office
Paris

Middle East
(MID) Office
Cairo

Eastern and
Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Sub-office
Beijing

Asia and Pacific
(APAC) Office
Bangkok



THANK YOU