



**DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/15)**

Montreal, 27 April to 1 May 2015

Agenda Item 5: Development of mitigating measures to address risks associated with the transport of lithium batteries including measures that address recommendations from the Second International Multidisciplinary Lithium Battery Transport Coordination Meeting

5.6: Miscellaneous lithium battery issues

**RESPONSES TO THE ISSUES RAISED IN THE INTERNATIONAL COORDINATION
COUNCIL FOR AEROSPACE INDUSTRY ASSOCIATION'S DGP-WG/15-WP/4**

(Presented by PRBA – The Rechargeable Battery Association)

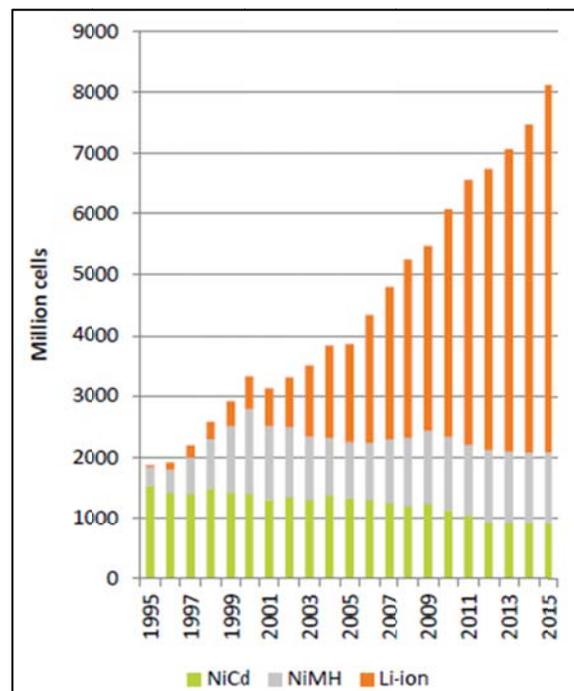
SUMMARY

This paper provides information regarding the transportation of lithium ion cells and batteries and responses to the issues raised in the International Coordination Council for Aerospace Industry Association's DGP-WG/15-WP/4.

1. INTRODUCTION

1.1 The safe transportation of lithium ion cells and batteries is the highest priority for PRBA and our members. We would like to take the opportunity in this working paper to thank the International Coordination Council for Aerospace Industry Association (ICCAIA) for DGP-WG/15-WP/4, expressing as it does, their concerns with respect to the safe transport of lithium ion batteries. PRBA recognizes that these issues have a profound and long-term impact on the use and distribution of lithium ion cell and batteries. These articles are essential to the safe operation in countless applications including the air transport industry, medicine, manufacturing, science and engineering and consumer products. This is an extremely important issue and we therefore would welcome the opportunity to work with ICCAIA and ICAO to address the concerns raised in DGP-WG/15-WP/4. PRBA also would like to offer the following observations and comments on a number of issues raised in DGP-WG/15-WP/4

1.2 Since lithium ion batteries were first introduced into the market in 1991, billions of lithium ion cells and batteries have been manufactured and safely transported by all modes of transport individually and/or in products (such as cellular phones, notebook computers, power tools, medical devices, military equipment and automobiles). The graph below shows the production numbers from 1995 to 2015 for the following types of rechargeable *cells*: nickel cadmium (NiCd), nickel metal hydride (NiMH) and lithium ion (Li-ion). As reflected in the graph, approximately 5.5 billion lithium ion cells were manufactured in 2014. These production numbers are a testimony to the industry’s outstanding safety record and the acceptance of lithium ion batteries as the preferred battery technology for thousands of consumer, medical, military and industrial applications. The percentage of lithium ion cells that are shipped by air is very low. Based on information provided to PRBA by its members and trade data published by the U.S. Bureau of the Census, PRBA estimates that somewhere between 10 and 30% of the lithium ion cells manufactured are shipped by air by the original cell manufacturers.



Source: Christophe PILLOT, Avicenne Energy

1.3 ICCAIA recommends that measures be introduced to “safely” ship lithium batteries and that they not be shipped in large quantities on aircraft until “safer” methods of transport are established and followed. Within the context of aviation, Section 2.1.1 of ICAO’s Safety Management Manual defines “safety” as “the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.”

1.4 Lithium ion cells and batteries have been safely transported on aircraft for the last 25 years and PRBA is not aware of a single incident involving the transport of a fully compliant shipment of lithium ion cells and batteries. The incidents that have occurred invariably have been caused by batteries that are of poor quality, counterfeit or have not been prepared for transport in accordance with the ICAO Technical Instructions. In addition, many substantive changes have been made to the testing, packaging, marking and labelling requirements applicable to lithium ion batteries in the ICAO Technical Instructions over the last 15 years. The chart below reflects most of these changes. More changes to the lithium ion battery regulations also are anticipated in 2017 based on the proposal in DGP-WG/15-WP/6. In short, the

current transport requirements already provide for a very safe method of transport for lithium ion cells and batteries.

Small, Excepted Lithium Batteries: 1999 – 2015 Changes to ICAO Technical Instructions

Text in red and highlighted indicates significant change from previous year

Year	Size of Battery Excepted		UN Testing?	Package Limits		Hazard Communication Label/Document
	Li ion ELC/Wh*	Li Metal		Li ion	Li Metal	
1999	≤ 25 g	≤ 25 g	Only for larger cells/batteries	None	None	None
2003	≤ 8 g	≤ 2 g	All cells/batteries	30 kg	30 kg	Yes. If package has > 12 batteries
2009	≤ 100 Wh	≤ 2 g	All cells/batteries	10 kg	2.5 kg	All packages
2013	≤ 100 Wh	≤ 2 g	All cells/batteries	2 batteries	2 batteries	All packages
Mandatory training for shippers also required in 2013						
2015	Lithium metal batteries banned as cargo on passenger aircraft					
2017	ICAO expected to adopt significant new restrictions on large shipments of lithium batteries.					

* 25 g ELC (Equivalent Lithium Content) = 300 Wh
8 g ELC = 100 Wh

1.5 The ICCAIA paper suggests that certification standards for aircraft do not take into account the hazards posed by dangerous goods including lithium batteries. To PRBA, this is a surprising revelation particularly since provisions for the carriage of dangerous goods by air have existed since the first edition of the IATA Restricted Articles Regulations that was published in 1956. Since that time there have been two fatal accidents in which dangerous goods have been cited as the probable cause (Pan Am Boeing 707 freighter, Boston, 3 November 1973; and ValuJet DC-9 passenger aircraft, Miami, 11 May 1996). It is difficult, therefore, to understand how it is that cargo hold certification requirements do not take account of dangerous goods.

1.6 The ICCAIA paper suggests that current lithium ion battery packagings do not prevent propagation of fire from one package to another. This is true for all dangerous goods: packaging standards are prescribed by the UN and fire resistance is not a criteria taken into account (except for packagings intended to contain very high activity radioactive material). These standards are multi-modal and so any proposal to introduce such criteria would need to be directed to the UN. Furthermore, many dangerous goods permitted for carriage on both passenger and cargo aircraft, if subjected to heat or fire, would cause events worse than those associated with lithium batteries. For example, the emergency response information for UN 1680, **Potassium cyanide, solid**, states that containers may explode when heated. UN 1680 is permitted for carriage on passenger aircraft.

1.7 The ICCAIA paper suggests that because of an explosive atmosphere being created in a unit load device (ULD), this condition can be created in any ULD. PRBA believes it is inappropriate to make this suggestion because the ULD tested by the U.S. Federal Aviation Administration is a unique, nearly air tight design with an internal fire suppression system. PRBA is aware of only one carrier that uses these types of ULDs in their operations. Therefore, the results of the FAA's recent lithium ion cell tests on ULDs are not representative of commonly used ULDs in the industry.

1.8 With regard to risk index in DGP-WG/15-WP/4, based on the industry's safety record, PRBA believes it is not appropriate to assign a likelihood of "occasional" to lithium ion batteries, with the resultant assessed risk index. It could be argued that since there are no documented cases of compliant lithium ion batteries failing in transport, a likelihood of "Improbable" is more appropriate. In fact, it has been noted on several occasions during the ICAO DGP meetings that an incident involving a lithium ion battery in air transport is a "low probability" event. With these points in mind, coupled with a severity of "catastrophic" or "hazardous," would result in a risk index of 2A or 2B, within the "tolerable region".

2. DISCUSSION

2.1 PRBA and our members have a vested interest in the issues raised by the ICCAIA in DGP-WG/15-WP/4 and recognize that these issues could have a profound and long-term impact on lithium ion cell and battery manufacturers, product manufacturers and carriers who transport these dangerous goods. While PRBA disagrees with several of the conclusions in DGP-WG/15-WP/4, we would welcome the opportunity to work with ICCAIA, its members and ICAO to find solutions to the concerns raised in DGP-WG/15-WP/4.

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