



DANGEROUS GOODS PANEL (DGP)

TWENTY-SECOND MEETING

Montréal, 5 to 16 October 2009

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel:

5.3: Review of provisions for dangerous goods relating to batteries:

- a) **lithium batteries**
- b) **battery-powered devices**
- c) **battery-powered mobility aids**

ENHANCED REQUIREMENTS FOR THE TRANSPORT OF LITHIUM BATTERIES

(Presented by R. Richard)

REVISED

SUMMARY

This paper summarizes current efforts within the United States to address issues relevant to the safe transport of lithium batteries. A broad overview of potential future improvements to lithium battery safety requirements which may be considered for implementation within the United States is included for the panel's review.

Action by the DGP: The DGP is invited to note the progress of the regulatory work being pursued within the United States domestic regulations and provide input as appropriate. When a notice is published, the DGP will be provided with a copy and invited to comment on the specific proposals contained in the notice. It is recommended that the DGP place particular emphasis in areas of outreach and enforcement of the existing provisions with member States, in order to reduce risk across the global transport system. It is also recommended that interested States work together to improve the safety message and distribution of battery safety information, and implement consistent enforcement actions to improve compliance.

1. INTRODUCTION

1.1 At the thirty-first session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods, the expert from the United States (U.S) presented a list of known or suspected lithium battery incidents and requested comments from the Sub-Committee on the best way forward to reducing

these incidents. Since that time, the Sub-Committee has created an informal working group tasked with evaluating lithium cell and battery testing criteria and made several revisions to the requirements of the UN Model Regulations. Concurrently, the United States has engaged a variety of stakeholders involved in lithium battery manufacture, testing and shipping with the goal of increasing safety through enhanced compliance with the appropriate standards. Enhanced compliance is being addressed through outreach, enforcement and the revision of regulations. This paper is intended to inform the DGP of recent and planned activities related to the safe transport of lithium batteries.

1.2 As indicated in previous papers presented for consideration by the panel, an analysis of the available incident data indicates that the most likely root causes for the lithium battery incidents appear to be:

- a) External Short Circuits — Occurs when exposed battery terminal came in contact with metal objects to short circuit the battery. External short circuits result in the generation of heat and may cause ignition of the surrounding combustible materials.
- b) Internal Short Circuits — May happen as a result of manufacturing defects, or poor quality control, flawed designs, or when the battery is physically damaged.
- c) Improper use — Mostly involving improper “charging” and/or “discharging” conditions associated with the use of equipment (i.e. computer or cell phone).
- d) Non-compliance situation — Causes include a faulty design of the battery (cells or battery packs), lack of proper IEC or UL certification in accordance with applicable standards, undeclared shipments by consumers or companies, or improper packaging, testing and classification.

1.3 Considering the immense quantity of lithium cells and batteries produced and transported every day, we have seen a comparatively small number of incidents. However, while the probability of a significant incident involving lithium batteries in transport is very low, the consequences of such an incident are potentially high. As such the issue is a priority not only for the U.S. Department of Transportation but also a subject of keen interest to U.S. Congress as it is an issue which directly impacts the safety of air travellers world-wide.

1.4 As the demand for lithium batteries increases, so do the risks associated with their transport, especially on board aircraft. The increasing manifestation of these risks, inside and outside of transport drives the need for stricter safety standards. Since 1991, the U.S. has identified thirty-eight air transport-related incidents and numerous additional non-transport incidents involving lithium batteries and devices powered by lithium batteries. These incidents occurred, variously, aboard both passenger aircraft and cargo aircraft, and prior to loading aboard an aircraft, and after the batteries were transported by air. Of these thirty-eight incidents, 18 involved a passenger aircraft. Several of these incidents occurred in the cabin of the airplane and often involved consumer electronic devices such as a flashlight, a notebook computer, or a portable entertainment device. The incident data suggests overheating or damage to the device occurred immediately prior to the first indications of an incident. The remaining twenty incidents involved lithium batteries transported aboard a cargo aircraft. Many of these incidents were attributed to external short circuiting and several packages did not afford appropriate protection of the batteries and did not display hazard markings or labels. The most recent list is available online at:

http://www.faa.gov/about/office_org/headquarters_offices/ash/ash_programs/hazmat/aircarrier_info/medial/Battery_incident_chart.pdf.

A review of these incidents indicates that the majority are most likely the result of non-compliance with existing transport safety provisions. More emphasis should be placed on educating the public on lithium battery safety and to more aggressively enforce the safety provisions currently in place.

1.5 As part of a larger initiative to manage lithium battery transportation risks, the U.S. intends to issue a public notice outlining proposals to modify the U.S. Hazardous Materials Regulations specific to lithium batteries. The proposals in the notice will be based on a comprehensive review of all aspects of lithium battery transport safety and include proposals relevant to regulatory exceptions, cell and battery testing, enhanced packaging, hazard communication and employee training. After a suitable comment period, the United States will develop a final rule and incorporate those revisions into the U.S. Hazardous Materials Regulations. While the specifics of the proposal remain under development, this paper is intended to provide the panel with information relative to the broad areas the rulemaking is anticipated to address. These include:

- a) Considering elimination of the current exceptions for certain lithium cells and batteries (other than those which pose a negligible risk such as button cells in equipment etc.). Requiring all lithium cells and batteries to be transported as Class 9 dangerous goods would improve the packaging and hazard communication relevant to these goods as well as ensure more appropriate handling and stowage.
- b) Enhancing the ability to verify compliance with the required design type testing. This could potentially be accomplished by requiring manufacturers to retain results of satisfactory completion of UN design type tests for each lithium cell and battery type or perhaps by requiring a quality assurance mark on the outside case of each cell or battery indicating compliance with the UN design type tests.
- c) Further enhancing the packaging requirements for lithium cells and batteries.
- d) Providing provisions for the transport of lithium cells and batteries for recycling or disposal and applying appropriate safety measures for the transport of these items in the aviation mode.
- e) Reviewing the stowage requirements for lithium batteries carried aboard aircraft and determining whether the stowage of lithium cells and batteries to crew accessible cargo locations on aircraft should be limited and whether batteries that are not accessible during flight should be stowed in a fire resistant container.

1.6 The U.S. has also engaged in a number of outreach activities to promote awareness and help to ensure that the best information possible relative to lithium battery safety is available to transport personnel and to the public. These include:

- a) The publication and distribution by the U.S. DOT (PHMSA and the FAA) of relevant safety advisories. These are available at: <http://www.phmsa.dot.gov/hazmat/regs/safety-notice> and http://www.faa.gov/about/office_org/headquarters_offices/ash/ash_programs/hazmat/regulation_policy/.
- b) The continued development of a comprehensive “SafeTravel” website specifically targeting air travellers and providing guidance in a form suitable for the general public. This website is: <http://safetravel.dot.gov/index.html>.

- c) The publication and distribution of a shipper's guide to safely prepare and transport batteries of all types by air. The shipper's guide is available at: http://safetravel.dot.gov/PHMSA_battery_guide.pdf.
- d) Engaging key stakeholders at conferences and in other public settings to discuss strategies and best practices.

1.7 In addition, the U.S. continues to monitor and investigate air incidents involving batteries of all kinds including lithium batteries. In conjunction with these investigations, the U.S. DOT continues to aggressively pursue enforcement actions against persons who violate safety regulations currently in place to protect the public from the risks posed by the air transport of lithium batteries. A major component of this work is ensuring that all lithium battery incidents are reported and that proper investigatory techniques are employed to determine the root cause of the incident including preservation of evidence and forensic analysis of the damaged equipment and batteries.

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