

STATEMENT OF  
FIRST OFFICER MARK ROGERS  
DIRECTOR, DANGEROUS GOODS PROGRAMS  
AIR LINE PILOTS ASSOCIATION, INTERNATIONAL  
BEFORE THE  
SUBCOMMITTEE ON RAILROADS, PIPELINES, AND HAZARDOUS  
MATERIALS  
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE  
UNITED STATES HOUSE OF REPRESENTATIVES  
WASHINGTON, DC  
May 14, 2009

**Carriage of Lithium Batteries as Cargo  
on Passenger and Cargo Aircraft (attachments [A](#) & [B](#))**

Good afternoon, Chairwoman Brown, Ranking Member Shuster, and members of the Subcommittee. I am Mark Rogers, a commercial airline pilot and Director of the Dangerous Goods Programs of the Air Line Pilots Association, International (ALPA). ALPA represents more than 54,000 pilots who fly for 36 passenger and all-cargo airlines in the United States and Canada. On behalf of our members, I want to thank you for the opportunity to provide our safety perspective on the carriage of lithium batteries as cargo on passenger and cargo aircraft.

ALPA has a vested interest in regulations governing shipments of hazardous materials aboard passenger and cargo-only aircraft. A topic of particular concern to us is the transport by air of lithium-ion and lithium-metal batteries. Over the past eight years, ALPA has urged the Department of Transportation's Pipeline and Hazardous Materials Administration (PHMSA) to:

- (1) Bring bulk shipments of lithium-metal (primary) and lithium-ion (secondary) batteries into the full scope of the dangerous goods regulations, and
- (2) Extend the prohibition of bulk shipments of lithium-metal batteries from passenger to cargo-only aircraft until adequate packaging standards can be developed to sufficiently protect the batteries.

**The Issue**

The degree of risk and well-documented history of incidents associated with lithium batteries justifies their inclusion in regulations pertaining to dangerous goods shipped by air, to include: packaging requirements, acceptance checks, package testing, labeling, quantity limitations and pilot notification. These measures are critically important as batteries are one of a few commodities in which damage to a shipment is the only thing necessary to start a fire. Experience has shown that a fire can emerge hours after battery damage has occurred. Undamaged lithium batteries may also self ignite and burn in the presence of a high-heat source.

Unlike other regulated dangerous goods such as dry ice and flammable paint, lithium-ion batteries are exempted (or follow different criteria) from the majority of the dangerous goods regulations, including requirements for dangerous goods labels, an acceptance check by an airline, and notification to the pilot in command, or Notice to Captain (NOTOC). It is inappropriate to provide significant regulatory relief for the transport of lithium batteries as cargo, especially in large quantities, considering that less hazardous items such as flammable paint and five pounds of dry ice are fully covered under the dangerous goods regulations.

## **Background**

There are two types of lithium batteries used in today's electronic devices; *lithium-ion*, which are typically rechargeable and *lithium-metal*, which are not normally rechargeable. Lithium-ion batteries are typically used to power devices such as laptop computers, cell phones and MP-3 players. Lithium-metal batteries typically power devices such as watches, flashlights and digital cameras.

While the vast majority of lithium batteries are transported safely, when they are damaged, defective, or subjected to an external or internal short circuit, they have the potential to burn violently, emitting flames, sparks and large quantities of smoke. There have been several recent lithium-ion fires, including a March 2008 in-flight fire on a Chicago-to-Tokyo flight and a June 2007 fire in a passenger terminal at the Los Angeles airport. Fortunately, in both cases, the fires were successfully extinguished before substantial damage to property or loss of life could occur. The extent of the problem is further evidenced by the growing number of events listed in the battery incident list maintained by the Federal Aviation Administration (FAA).

Following a fire involving lithium-metal batteries in Los Angeles in 1999, the FAA Technical Center undertook a study of lithium-metal batteries and their response to an external fire source (DOT/FAA/AR-04/26). Among the findings published in June 2004, the FAA concluded that a fire involving one lithium-metal battery would spread to all batteries in a shipment, that the fire would burn violently at a temperature above the melting point of aluminum, that the heat from a suppressed cargo fire (approximately 400 deg. F) would be enough to ignite the batteries, and that ignition and fire would be accompanied by a pressure pulse that could cause the cargo compartment lining of an aircraft to fail. Especially significant was the finding that the traditional aircraft fire suppression agent, Halon 1301, would have no effect on a lithium-metal battery-initiated fire. In effect, damage to a single battery in a shipment of hundreds or thousands could lead to an uncontrollable fire.

After publication of the FAA report, the DOT issued immediate rule-making that banned the bulk shipment of lithium-metal batteries on passenger aircraft, leaving unchanged the provisions for shipment by cargo-only aircraft. Because ALPA has long insisted on *One Level of Safety* for both passenger and all-cargo aircraft, we continue to advocate that PHMSA extend the ban on lithium-metal batteries to cargo-only aircraft until adequate packaging can be developed to protect lithium-metal batteries and the aircraft upon which they are transported.

On January 1, 2009, the vast majority of lithium-metal and lithium-ion batteries were permitted to be shipped internationally on aircraft under packaging instructions 965-970 of the

International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air, providing that certain size, testing, packaging and marking requirements are met. These requirements, however, do not include dangerous goods labels or notification to the flight crew. Because this carriage standard is of significant importance to the well-being of our membership, ALPA is working through ICAO and the United Nations Committee of Experts on the Transport of Dangerous Goods (UNCOE) to improve the safety of international air transport of hazmat including batteries. Clearly, a strong US PHMSA law is important to that end.

### **Justification for Change**

Air safety would be greatly enhanced by improved packaging, better testing, a dangerous goods label that would be easily recognizable to ground handlers and emergency responders, an acceptance check to verify that the regulations have been complied with, and notification to the pilot in command that lithium-ion batteries were being carried in accordance with the hazardous materials regulations (HMR).

While lithium-ion batteries can be safely transported once fully incorporated into the dangerous goods regulations, the characteristics of lithium-metal batteries make them unsuitable for transport in bulk quantities aboard passenger or cargo aircraft. In short, there is no safety justification for allowing bulk shipments of lithium-metal batteries to continue to travel on cargo-only aircraft when there is no adequate fire-suppression agent currently available. Accordingly, until adequate HMR packaging standards can be developed to protect all occupants of an aircraft in case a shipment of lithium-metal batteries is exposed to fire of any origin, and to protect the batteries from external damage, we urge PHMSA to ban bulk shipments of lithium-metal batteries on both passenger and cargo aircraft.

On December 4, 2007 the NTSB held a public meeting and issued a report (NTSB/AAR-07/07) of its investigation into the in-flight cargo fire on a UPS cargo-only aircraft on February 7, 2006. A synopsis of the executive summary and list of conclusions from that report is provided as Attachment A. In its report, the NTSB substantiated ALPA's concerns concerning the carriage of lithium batteries by air.

As part of that report, on December 17, 2007 the NTSB issued a letter (Attachment B) to PHMSA with its recommendations A-07-104 through -109. Although the content of the letter epitomizes ALPA's position on this matter, NTSB Recommendations A-07-104 and A-07-109 speak directly to our concerns. In A-07-104, the NTSB recommends that PHMSA "*require aircraft operators to implement measures to reduce the risk of primary lithium batteries becoming involved in fires on cargo-only aircraft, such as transporting such batteries in fire resistant containers and/or in restricted quantities at any single location on the aircraft.*" This recommendation is consistent with the ALPA position to ban bulk shipments until adequate packaging is developed.

Additionally, in NTSB Recommendation A-07-109, PHMSA is urged to "*Eliminate regulatory exemptions for the packaging, marking, and labeling of cargo shipments of small secondary lithium batteries (no more than 8 grams equivalent lithium content) until the analysis of the*

*failures and the implementation of risk-based requirements asked for in Safety Recommendation A-07-108 are completed.”*

## **Recommendations**

The full regulation of lithium metal and lithium ion batteries will significantly increase the safety of these commodities when shipped aboard aircraft. Class 9 requirements will result in packages that are tested and certified, resulting in a higher quality packaging which will limit the possibility of fire following damage. The Class 9 label on the package will make the shipment more visible to ground crews loading the aircraft, raising their awareness of the potential danger if the shipment is mishandled or damaged. The Class 9 label is recognizable and easily identifiable, and does not rely on text or understanding of the English language. Inclusion in Class 9 will also result in an acceptance check being performed by the operator, which would limit the potential of an improper or damaged package being placed into transport. Although not currently required, major cargo carriers may also choose to remove Class 9 shipments of lithium batteries from the general cargo stream at major sort facilities. Pilot notification of Class 9 shipments of lithium batteries will enable flight crews to communicate hazard information to first responders in the event of an incident.

The testing proposed by ALPA would allow a data-driven approach to be used to determine the appropriate types of packages and quantities for both lithium metal and lithium ion batteries aboard passenger and cargo aircraft. For both lithium metal and lithium ion batteries, it must be shown that the aircraft Halon fire suppression system is sufficient to suppress a fire in a cargo compartment containing lithium batteries until the aircraft has an opportunity to land (as long as 3 hours in Extended Twin Engine Operations (ETOPS)). This ability must be demonstrated both for fires originating with the batteries and for fires from another source in a cargo compartment containing lithium batteries.

We recommend that DOT amend the regulations addressing the safe transport of lithium metal (primary) and lithium ion (secondary) batteries aboard aircraft to accomplish the following:

1. Remove regulatory exemptions for the transport of cargo shipments of lithium-ion batteries; these batteries should be shipped in complete accordance with the dangerous goods regulations, including packaging requirements, labeling, testing, flight crew notification and quantity limitations.
2. Ban bulk shipments of lithium-metal batteries on passenger and cargo aircraft until adequate packaging standards can be developed to protect these batteries from a fire from any source.
3. Incorporate NTSB recommendations concerning lithium batteries into the Hazardous Materials Regulations (HMR).

The regulations should contain the following provisions and be enacted as soon as practicable:

- Regulate lithium metal and lithium ion batteries as Class 9 material, including requiring package testing, labeling, and pilot notification.

- Create very limited exceptions to Class 9 requirements for button cell batteries and batteries installed in equipment, so long as other regulatory provisions limit the danger posed by these batteries.
- Adopt regulatory measures to limit the total quantity of lithium batteries in a package and in a cargo compartment. Specifically, the provision granting relief from the limit of 55 net pounds of dangerous goods per inaccessible cargo compartment for Class 9 materials should not be applied to lithium metal or lithium ion batteries.
- Prohibit the transport of lithium ion batteries in non-Class C compartments (cargo compartments not protected by Halon suppression systems). Non-Class C cargo compartments include the main deck cargo compartment of freighter aircraft and those under-floor cargo compartments on freighter aircraft that have not been converted from Class D to Class C.
- Extend the current ban on cargo shipments of lithium metal batteries on passenger aircraft to cargo aircraft until adequate packaging standards are adopted. Lithium metal batteries packed in or with equipment would continue to be permitted for both passenger and cargo aircraft.

Furthermore, ALPA recommends that the DOT/FAA conduct the following testing and amend the regulations as appropriate:

- Evaluate the effectiveness of metal inner and/or outer packagings for lithium metal batteries. Testing should determine if the residual heat from a Halon suppressed cargo fire would be sufficient to cause auto-ignition of the batteries in metal packagings.
- Determine the effectiveness of metal packagings in preventing the spread of a fire from one package to an adjoining package of lithium metal batteries.
- Determine the effectiveness of an aircraft Halon fire suppression system in suppressing a fire involving the maximum quantity of lithium metal batteries in metal packagings permitted in a cargo compartment.
- Evaluate the effectiveness of an aircraft Halon suppression system on a fire involving the maximum permitted quantity of lithium ion batteries in completed packagings.
- Evaluate the effectiveness of fire resistant packagings, pallets, and/or ULDs in preventing the spread of fire initiated within the package, and in preventing the ignition of batteries following a fire from an outside source.

In conclusion, I want to express ALPA's appreciation for this Committee's interest in the safe transport of lithium batteries as cargo on passenger and all-cargo aircraft. Our recommended actions for incorporation into the PHMSA reauthorization bill will greatly enhance the overall safety of moving these batteries through the transportation system. Thank you for the opportunity to testify today. I would be pleased to address any questions that you may have.

###