U.S. transportation officials expect to finalize new rules later this year for the air transportation of lithium batteries and cells — including those that are packed with or contained in equipment.

Dozens of organizations submitted comments on proposed rules changes before the public comment period ended in mid-March. The Pipeline and Hazardous Materials Safety Administration (PHMSA) — the U.S. Department of Transportation agency that developed the notice of proposed rule making (NPRM) in cooperation with the Federal Aviation Administration (FAA) — said the changes are needed to reduce the chemical and electrical risks associated with lithium batteries.

"This rule making is important for the protection of the traveling public and many of those who work in the aviation industry," U.S. Transportation Secretary Ray LaHood said. "This rule will help

BY LINDA WERFELMAN

Battery Rules

U.S. officials are considering proposed changes in the requirements for transporting lithium batteries in cargo and passenger aircraft.

'This rule will help us achieve a safer aviation environment without imposing a ban on the transport of lithium batteries by air.'

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The proposed rules, published in the *Federal Register* on Jan. 11, 2010, apply to lithium batteries and cells transported in cargo airplanes or in the cargo holds of passenger airplanes — not to individual batteries carried on board by passengers in their personal electronic equipment.

"If not safely packaged and handled, lithium batteries can present a significant risk in transportation," PHMSA said in the proposed rule. "Batteries which are misused, mishandled, improperly packaged, improperly stored, overcharged, or defective can overheat and ignite, and, once ignited, fires can be especially difficult to extinguish. Overheating has the potential to create a thermal runaway, a chain reaction leading to self-heating and release of the battery's stored energy."

PHMSA and the FAA have identified 44 air transport-related incidents since 1991 that involved lithium batteries that overheated or short-circuited. The incidents "illustrate the short circuit and fire risks … and the potential for a serious incident," the proposed rule said. Of the 44 incidents, 23 occurred on cargo aircraft, four in passenger aircraft cargo holds, one in checked baggage and 16 in carry-on items.

In addition to these incidents, PHMSA noted that a United Parcel Service McDonnell Douglas DC-8-71F and most of its cargo were destroyed by a fire that was believed to have been caused by lithium batteries. The three crewmembers in the airplane evacuated after landing at Philadelphia International Airport; all three received minor injuries from smoke inhalation (*ASW*, 4/08, p. 28).[1]

As a result of its investigation of that accident, the U.S. National Transportation Safety Board (NTSB) issued a series of safety recommendations, including requiring operators of cargo airplanes to transport the batteries in fire-resistant containers and/or to limit the quantity of batteries at any single location on an airplane.

Proposed Changes

The changes proposed by PHMSA include the following:

- "Eliminate regulatory exceptions for small lithium cells and batteries when included in an air shipment and require their transportation as Class 9 materials,[2] meaning they could pose a hazard when transported;
- "Subject packages of small lithium batteries to well-recognized marking and labeling requirements for hazardous materials;
- "Require transport documentation to accompany a shipment of small lithium batteries, including notifying the pilot-in-command of the presence and location of lithium batteries being shipped on the aircraft;
- "Require manufacturers to retain results of satisfactory completion of United Nations design-type tests for each lithium cell and battery type;
- "Limit stowage of lithium cell and battery shipments aboard aircraft to cargo locations accessible to the crew or locations equipped with an FAA-approved fire suppression system, unless transported in a container approved by the FAA administrator; and,
- "Apply appropriate safety measures for the transport of lithium cells or batteries identified as being defective for safety reasons, or those that have been damaged or are otherwise being returned to the manufacturer, and limit the transportation of defective or damaged cells or batteries to highway and rail."

Public Comments

In comments submitted in response to the proposed changes, the Air Line Pilots Association, International (ALPA) said it "has long voiced concern that current provisions in the hazardous materials regulations governing the transport of lithium batteries by air are inadequate to protect crewmembers, passengers, cargo and

the traveling public" and that the organization supports most sections of the NPRM.

ALPA specifically endorsed several provisions, including the elimination of exceptions for small lithium batteries, saying that the batteries "present an unusual, significant risk in transportation, since nothing more than a damaged package is necessary to start a fire, possibly several hours after the damage occurred."

The organization also endorsed provisions to strengthen requirements for testing new lithium battery designs and to revise shipping names for lithium batteries to differentiate between lithium ion batteries and lithium metal batteries, which have different chemistries and different fire characteristics.

The International Federation of Air Line Pilots' Associations (IFALPA) said that it also supports adoption of the NPRM, although "we would prefer a globally harmonized approach" to regulating the transport of lithium batteries. IFALPA is especially supportive of sections of the NPRM that would "align [U.S. regulations] with the provisions in the International Civil Aviation Organization (ICAO) 'Technical Instructions for the Safe Transport of Dangerous Goods,'" and it cited provisions to "adopt new, proper shipping names for lithium ion and lithium metal batteries and to adopt a watt-hour rating in lieu of equivalent lithium content."

The International Air Cargo Association said that portions of the NPRM "veer sharply away" from the concept of international harmonization with "numerous regulations that would deviate significantly from international standards." As an example, the association cited provisions that deviate from ICAO's "Technical Instructions" by "eliminating exceptions for most small, consumer-type batteries … and by restricting where such shipments may be stowed aboard aircraft."

The association said the "real problem … is lithium battery shipments that are not compliant with existing regulations. … This calls for better enforcement, rather than sweeping new regulations."

The Air Transport Association of America (ATA), noting that its member carriers transport 90 percent of U.S. airline passenger and cargo traffic, said the NPRM is "far more restrictive" than ICAO's requirements.

"The measures proposed … are not likely to address the root causes of past or potential future incidents in air transportation but would certainly result in substantial processing and operational delays that would disrupt the expeditious movement of goods along the supply chain and cause significant economic harm to a broad spectrum of commerce," the ATA said. "Such disruptive impacts should be carefully considered along with a thorough and candid evaluation of the effectiveness of proposed changes."

The Rechargeable Battery Association recommended that PHMSA abandon the NPRM in favor of the ICAO requirements.

The association "remains strongly committed to safety," said Executive Director George Kerchner, "but this rule would not address the principal cause for concern — non-compliance by shippers with existing transport regulations — while imposing unacceptable costs on all Americans."

In its public comment, the association added, "Billions of lithium ion cells and batteries have been shipped over the past decade, many repeatedly, without a single fire on an aircraft attributable to lithium ion cells, batteries or the products into which they are incorporated where existing U.S. regulations … were complied with."

'Nothing more than a damaged package is necessary to start a fire, possibly several hours after the damage occurred.'

Notes

1. NTSB. Accident Report NTSB/AAR-07/07: *Inflight Cargo Fire: United Parcel Service Company Flight 1307, McDonnell Douglas DC-8-71F, N748UP, Philadelphia, Pennsylvania, February 7, 2006*. The NTSB was unable to determine the cause of the fire because "potentially helpful evidence" was destroyed in the blaze.
2. Class 9 materials are designated by the U.S. Department of Transportation as "miscellaneous dangerous goods."

Further Reading From FSF Publications

Rosenkrans, Wayne. "Thermal Runaway." *AeroSafety World* Volume 3 (March 2008): 42–48.