



AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

535 HERNDON PARKWAY □ P.O. BOX 1169 □ HERNDON, VIRGINIA 20172-1169 □ 703-689-2270
888-FLY ALPA (888-359-2572) □ FAX 703-689-4370

Comments Submitted Electronically

March 12, 2010

Dockets Management System
U.S. Department of Transportation
Dockets Operations, M-30
Ground Floor, Room W12-140
1200 New Jersey Avenue, SE.
Washington, DC 20590-0001

Subject: Docket No. PHMSA-2009-0095 (HM-224F), Hazardous Materials, Transportation of Lithium Batteries

Dear Sir/Madam:

The Air Line Pilots Association, International (ALPA), representing the safety interests of 53,000 professional airline pilots flying passenger and cargo aircraft for 38 airlines in the United States and Canada, appreciates the opportunity to comment on the proposed Department of Transportation's (DOT) Pipeline and Hazardous Materials Safety Administration's (PHMSA) notice of proposed rulemaking (NPRM) concerning the transportation of lithium batteries.

ALPA 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 travelling public. We support most of the proposals in the NPRM, such as adopting the new shipping names, a watt-hour rating in lieu of using equivalent lithium content, changes to design type tests, a mark indicating successful completion of those tests, and allowing an operator to carry lithium batteries in the cabin. We believe that the proposed changes will have a significant, positive impact on the safety of the air transportation system.

We applaud the Department of Transportation for this rulemaking and believe it should be adopted with additional requirements for lithium metal batteries, somewhat revised requirements governing accessibility, and a focus on additional testing. We agree that safety is best served through the early implementation date proposed by the DOT and offer the following detailed comments on its content.

Revision of Proper Shipping Names

ALPA supports PHMSA's proposal to revise the proper shipping names for lithium batteries (UN 3090), lithium batteries packed with equipment (UN 3091), and lithium batteries contained in equipment (UN 3091) to differentiate between lithium-metal batteries (including lithium alloy batteries) and lithium ion lithium-ion batteries (including lithium polymer batteries). Lithium

metal and lithium ion batteries have significantly different chemistries and fire characteristics, necessitating different emergency response actions.

Additionally, testing by the Federal Aviation Administration (FAA) has demonstrated that lithium metal battery fires are not responsive to Halon, the fire extinguishing agent used aboard aircraft. Accordingly, it is appropriate to apply more stringent transport conditions to lithium metal batteries. In order to properly identify each type of battery, it is necessary to have separate proper shipping names. This proposal would harmonize the proper shipping names in the United States with those adopted at the United Nations (UN) and the International Civil Aviation Organization (ICAO), facilitating global shipments of lithium metal and lithium ion batteries.

Watt Hour versus Equivalent Lithium Content

We support the proposal to adopt a watt-hour requirement for lithium ion batteries in lieu of determining equivalent lithium content. The term “equivalent lithium content” is not well understood, nor is it generally used to describe the energy content of a battery. In contrast, both the UN and ICAO have adopted watt-hours to determine the relative strengths of lithium ion batteries, and have adopted proposals that will require all new lithium ion batteries to be marked with the watt-hour rating of the battery.

Revision to Design Type Testing Requirements

Effective design type testing of lithium batteries is critical to ensuring that new lithium battery designs will safely withstand exposure to the severe environmental conditions encountered during transportation and use. Testing must be sufficiently rigorous to ensure that batteries can be transported safely, not just directly after production, but also at the end of their useful life.

ALPA agrees with PHMSA that the requirements in the United Nation’s Manual of Testing and Criteria should be strengthened and clarified, and supports the changes proposed in this rulemaking. Specifically, ALPA supports revising the criteria for a new design type test from the current change of 0.1 grams or 20% by mass to the anode, the cathode, or electrolyte material to a more restrictive change of 0.1 grams or 5% by mass to the anode, the cathode, or electrolyte material. We also agree that the criteria in the UN Testing Manual are too broad, and support the inclusion of the examples listed in the rulemaking. These proposals will ensure that more new battery types are tested, reducing the likelihood of a short circuit or other dangerous condition in transportation.

ALPA concurs with the inclusion of an internal short circuit test, if a consensus for a reliable test method emerges at the United Nations working group on lithium battery testing. Additionally, ALPA supports the PHMSA proposals to modify the terms “module” and “battery assembly,” adopt new definitions of “large batteries” and “small batteries,” and to modify the testing protocol for large batteries and battery assemblies.

Because testing is vital to ensure that battery designs are safe for transportation, ALPA further agrees that more steps need to be taken to make certain that batteries have met the requirements of the design type testing. Accordingly, we support the proposed requirement to retain evidence of satisfactory completion of the design type tests. Retention of the testing results will aid in oversight, enforcement and outreach, adding to the safety of the air transportation system.

ALPA further supports the proposal to require a visible marking on the outside case of each cell or battery. A battery may be transported several times by multiple shippers after production and testing. A visible mark would help those shippers determine that the cells and batteries had been properly tested prior to being placed in the transportation system. A mark may also help prevent the transportation of counterfeit batteries, which may be more likely to be involved in an incident due to poor manufacturing, low quality materials and the lack of manufacturing quality control.

Elimination of Exceptions for Small Lithium Batteries

ALPA strongly supports the elimination of regulatory exceptions for small lithium batteries. When not properly manufactured, packaged or handled, lithium batteries present a risk in transportation, including in-flight fire and the potential loss of an aircraft and its occupants. Additionally, lithium batteries may ignite when exposed to an external fire or the residual heat from a suppressed cargo fire. ALPA believes that the risk presented in transporting lithium batteries, including lithium batteries packed with or in equipment, is sufficient to justify them being fully regulated within the hazardous materials regulations.

Lithium 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. This outcome is very different when compared to other highly regulated substances, where absent an ignition source, a damaged package will only result in a spill. Hazardous materials have been safely transported for decades under Department of Transportation regulations, and ALPA believes that bringing lithium batteries fully into this regulatory scheme will have significant safety benefits, as outlined in the following sections:

Labeling

Although classified as a Class 9 material, most lithium battery packages are not currently required to carry the Class 9 label. Requiring this label to appear on lithium battery packages would significantly increase the visibility of lithium battery shipments and clearly communicate the risk these shipments pose to airline acceptance and handling personnel.

Unlike other battery labels or markings in use internationally, the Class 9 label is easily recognizable and does not require an understanding of English. Because all air carrier personnel are trained to recognize that diamond labels represent hazardous materials, it is highly likely that a package bearing a Class 9 label would be handled with care, and not loaded on an aircraft after being damaged. Furthermore, packages bearing hazard

warning labels are normally removed from the general freight stream for non-regulated packages and would be subject to an acceptance check, ensuring more oversight and a lower likelihood of damage to the package. Since damage to a hazardous materials package is all that may be necessary to cause a fire, the increased safety level afforded by a Class 9 label is clearly justified.

ALPA does agree, however, that the ICAO battery handling label should be allowed to appear on a package, in addition to the diamond Class 9 label. While rendered in English and not in the diamond shape most widely recognized as being associated with hazardous materials, affixing the ICAO battery handling label to a package would only improve awareness of lithium battery shipments and improve safety.

Packaging

PHMSA proposes to enhance packaging requirements for lithium batteries. Since an external short circuit and damage to the battery are two major causes of lithium battery incidents, ALPA agrees these improved packaging standards are necessary to improve the safety of lithium battery shipments. Specifically, the proposed requirement to transport lithium cells or batteries in inner packagings of combination packagings that completely enclose the cell or battery will significantly reduce the likelihood of short circuits caused by batteries in a shipment coming into contact with each other.

Acceptance Check

By eliminating regulatory exceptions for lithium battery shipments, packages containing lithium batteries will be separated from general freight, reducing the possibility of inadvertent damage. They would also be subject to an acceptance check by airline personnel prior to being placed in air transportation, including inspection of the package to detect damaged or improperly prepared packages. These measures would reduce the number of improperly prepared or damaged packages carried aboard aircraft.

Pilot Notification

ALPA maintains that providing pilots with written notification of the presence of lithium battery shipments will increase safety and supports the proposal in the NPRM. Under the current regulatory system, pilots would receive written notification when, for example, five pounds of dry ice or flammable paint is loaded onto an aircraft, but would be unaware of a pallet of thousands of lithium batteries loaded adjacent to these shipments. The flight crew is the last link in the hazardous materials safety chain and providing them with a pilot notification form can prevent improperly prepared shipments from being loaded onto an aircraft.

Knowledge of the size, location and the quantity of lithium battery shipments will assist the crew decision making process during an in-flight emergency. This information, when

considered in association with the potential severity of a fire, including the inability of Halon to suppress a lithium metal battery fire, could alter the choice of diversion airports, particularly when a pilot is evaluating those with differing weather conditions or facility capabilities. This awareness may also influence a decision to conduct a water or off-airport landing while the aircraft is still intact.

Providing information concerning lithium battery shipments on the pilot notification form also enables the flight crew to inform air traffic control and emergency response personnel of the size and location of a lithium battery shipment, enhancing their ability to protect the aircraft, its occupants, themselves and the environment. In order to make the best possible decision and receive the highest level of emergency response in such circumstances, the flight crew needs all available information. ALPA believes that requiring the listing of lithium battery shipments on the pilot notification form enhances the information available to the crew and significantly improves safety.

Training

Removing regulatory exceptions for most lithium battery shipments will impose training requirements in the hazardous materials regulations on both shippers and air carrier personnel. ALPA supports this required training and believes it may have the single largest impact on reducing the number of lithium battery incidents in air transportation.

Many battery-related incidents have been the result of improperly prepared shipments. Required training would greatly increase compliance with packing requirements and aid air carrier personnel in discovering improperly prepared shipments. In cases where improperly prepared shipments have caused fires aboard aircraft, the non-compliance has generally been the result of an incomplete or improper understanding of the regulations, not a deliberate attempt to avoid them. Training in hazardous materials regulations has been very effective in preventing incidents involving other types of hazardous materials and ALPA believes it would be equally effective in reducing lithium battery incidents.

The Department of Transportation has undertaken a significant outreach effort and public awareness campaign over the past decade to educate shippers and the public about the risks associated with lithium battery shipments and how to properly package them. While laudable, this outreach effort has failed to significantly reduce the number of battery incidents in transportation. With training requirements in place, ALPA believes that the DOT's outreach efforts will be more effective since shippers will be required to develop and provide DOT-approved training programs and maintain records of successful employee completion. We recognize that this training places an additional cost burden on industry, but considering the cost of a single, major, hull-loss accident, we feel it is justified and a necessary component of a safe transportation system.

Exceptions for Small Lithium Batteries Installed in Equipment

An exception for small lithium batteries (under 0.3g lithium or 3.7 Wh) packed with or contained in equipment is proposed in the NPRM. While we are unaware of any testing results that can be used to justify such an exception, we agree in general that button cell-sized or smaller batteries represent little risk in transportation when packed with or in equipment. The equipment itself affords a level of protection to the batteries and prevents thousands or hundreds of thousands of these batteries from being packaged together and creating an aggregate hazard. ALPA does, however, have some concern that the limits proposed in the NPRM would provide exceptions for batteries larger than button cells. We therefore propose that the exception language be specifically limited to button cells when packed with or contained in equipment.

Lithium Batteries Carried in the Cabin by an Operator

The NPRM references a petition from the Air Transport Association of America (ATA) and the Regional Airline Association (RAA) requesting the ability to carry a limited number of lithium batteries in the cabin in a constant state of readiness. Based on the results of testing done by the DOT, the Civil Aviation Association (CAA) of the United Kingdom and the Norwegian Defense Institute, ALPA and the International Federation of Air Line Pilots Associations (IFALPA) have worked together to develop procedures for flight crews to follow in the event of a lithium battery incident in the cabin. If a lithium battery were to catch fire in the cabin of a passenger aircraft, the fire would be quickly discovered and most likely limited to a single battery or device. With the proper procedures and training, the flight crew should be able to effectively respond to such an incident in the cabin and ensure a safe outcome for the flight.

ALPA therefore agrees that airlines should be permitted to carry lithium batteries in the cabin to power devices such as electronic flight bags, onboard medical monitoring devices, portable oxygen concentrators, personal electronic devices and credit card readers.

Exceptions Based on State of Charge

ALPA recognizes that the energy in a lithium ion battery and the intensity of a fire involving that battery is directly related to its state of charge. A lower state of charge reduces the risk posed by a battery in transportation. We are concerned, however, with incorporating state of charge requirements in the hazardous materials regulations, as this provision will be nearly impossible to verify or enforce. While a shipper may be able to accurately determine the state of charge for a laptop battery, it would be nearly impossible for anyone other than the manufacturer to determine the state of charge of smaller batteries. We therefore do not support using state of charge parameters to justify relaxing any regulatory requirement.

Elsewhere in our comments, we have requested that further testing be conducted to determine what constitutes a safe quantity of lithium batteries in a cargo compartment. We believe this testing should be done with batteries fully charged.

Packaging and Stowage of Lithium Ion Batteries

ALPA believes it is vitally important to limit the quantity of lithium ion batteries stored in a single location as well as in a single cargo compartment. Because a fire may be the result of an internal short circuit, defective design or counterfeit battery, no amount of packaging or training will prevent every incident. The severity of that incident, however, can be effectively managed by controlling the number of batteries in close proximity to each other.

We are encouraged by testing that has shown that Halon would be effective in suppressing a fire involving lithium ion batteries, but are concerned that a fire involving large quantities of these batteries will eventually overwhelm a Halon suppression system. While a single battery packaged for transport may not represent a major risk for the aircraft, when that battery is packaged with hundreds or even thousands of other lithium ion batteries, the risk is substantially increased. We recognize that the only way to effectively restrict the number of batteries at a single location is to eliminate the exceptions for individual batteries and we applaud the DOT for proposing this important step.

We request that the DOT take additional action by conducting fire-safety research using lithium ion batteries packaged for transport in a Class C cargo compartment. This testing would determine the appropriate quantity of batteries that that can be safely transported in a single compartment without overwhelming an aircraft Halon suppression system. Specifically, the testing should determine how long it would take before a fire involving a single, fully charged lithium battery in either a ULD or bulk loaded would be detected, how quickly that fire would spread to additional lithium batteries in the shipment, and how effective the Halon system would be in suppressing the fire. The testing should also determine how many fully charged batteries simultaneously igniting could be suppressed by a typical Halon system. The results from this testing should be used to determine the maximum quantity of batteries permitted in a single Class C cargo compartment.

Until this testing is complete, ALPA recommends that the DOT impose a conservative limit on the number of batteries permitted in a single cargo compartment. While we do not have the expertise or testing data to propose such a limit, we respectfully suggest that the FAA Technical Center, which conducted the 2006 fire testing of bulk packaged lithium ion batteries, may be able to assist the DOT in determining an interim limit.

We also recognize that lithium ion batteries are currently permitted to be shipped aboard cargo aircraft not equipped with Class C cargo compartments. We therefore request that additional testing be conducted with packaged lithium batteries in both Class D and E

cargo compartments to determine the maximum safe quantity of batteries in these compartments, or be used as a basis to restrict the loading of lithium ion batteries to Class C compartments.

Lithium Metal Batteries

ALPA has long expressed concern with the risk posed by lithium metal batteries to air transportation and the more permissive regulatory standards applied to them when carried aboard cargo-only aircraft. Although lithium metal batteries were prohibited for transport aboard passenger aircraft (except when installed with or contained in equipment) by the DOT in 2004, they are permitted to be transported in unlimited quantities and without being fully regulated aboard cargo-only aircraft.

ALPA believes that a single level of safety should exist for both passenger and cargo air operations and has long advocated for substantially improved provisions for the carriage lithium metal batteries on both of these transport categories. We are encouraged that the NPRM proposes to eliminate most regulatory exceptions for lithium metal batteries, but we believe that the packaging and stowage requirements do not go far enough to ensure an adequate level of safety.

Until adequate packaging can be developed to protect lithium metal batteries from damage, prevent a fire involving a packaged lithium metal battery from spreading to other batteries, and prevent packaged lithium metal batteries from igniting from the heat of an independent fire, the prohibition currently applied to carriage of lithium metal batteries on passenger aircraft should be extended to cargo-only aircraft. ALPA has expressed its position on this issue to DOT on numerous occasions prior to this NPRM response. We also propose that the DOT conduct testing similar to that outlined for lithium ion batteries to determine the type of packaging and the safe number of packaged lithium metal batteries that should be permitted in Class C, Class D and Class E compartments.

Accessibility and Class C Cargo Compartment Requirements

Because a flight crew may not be able to expeditiously land an aircraft following the outbreak of an on-board fire, the pilots must have the means to suppress an in-flight fire involving any properly declared commodity. We are concerned that the NPRM proposes to allow lithium batteries to be transported in accessible locations as an alternative to placing the batteries in a cargo compartment with a suitable fire suppression system. By requiring lithium ion batteries to be accessible, they would be placed together with other highly regulated and flammable substances, increasing the potential for igniting or increasing the severity of an onboard fire.

Accessibility provides a very basic means of fire suppression, requiring one crewmember to leave the cockpit and enter the cargo compartment with a hand held fire extinguisher.

While preferable to having no ability to attempt to extinguish an on board fire, the likelihood of a crew member being successful in extinguishing a cargo fire using the accessibility provisions is unfortunately relatively small. Therefore, we therefore do not support permitting lithium ion batteries to be placed at an accessible cargo position as an alternative to stowing the batteries in a Class C cargo compartment.

ALPA believes that lithium ion batteries should be required to be stowed in a Class C cargo compartment. Although not required, an increasing number of large, transport category cargo aircraft are equipped with Class C cargo compartments. It should be noted that large volumes of freight are also carried in transport category passenger aircraft which are required to be equipped with Class C cargo compartments. It is ALPA's position that, if a Class C compartment does not exist on an aircraft, shipments of these batteries should not be permitted on board unless additional testing determines that they can be safely transported in either Class D or Class E cargo compartments.

If the DOT does not agree that lithium ion batteries can only be safely transported in Class C cargo compartments, we acknowledge that accessibility provides an improved level of safety over an inaccessible cargo compartment with no fire suppression agent. In this case, we propose requiring lithium ion batteries to be stowed in a Class C compartment when available, or in severely restricted quantities and proper packaging at an accessible location otherwise. This would allow a very basic level of fire suppression, as well as enable the flight crew to inspect the package before flight and further remove it from the general cargo stream.

We do not agree that the accessibility provisions should be applied to lithium metal batteries. If a fire were to occur, it is likely that a crewmember would attempt to extinguish the fire using a hand-held Halon fire extinguisher. Because FAA testing has shown that Halon is ineffective in suppressing a lithium metal battery fire, the result would be an uncontrollable fire located adjacent to other potentially highly flammable substances. ALPA contends that lithium metal batteries should only be transported in packaging sufficient to protect them from damage, to prevent a fire involving a single battery from spreading, and to protect the battery from an external independent fire or high heat source. These packages should then only be transported in limited quantities and in cargo compartments capable of extinguishing any resultant fire.

Compliance Date

ALPA remains concerned that the provisions of the current hazardous materials regulations do not adequately ensure the safe transportation of lithium batteries, and we have previously requested an emergency prohibition of lithium battery shipments until the deficiencies have been addressed. We believe that the provisions outlined in this NPRM, once enacted, will have a significant positive impact on safety and may preclude the need for a prohibition.

We also point out that many of the provisions proposed have already been adopted internationally, easing compliance for shippers already familiar with the ICAO Technical Instructions. In those cases where the proposed regulations exceed the requirements in the Technical Instructions, the proposals are generally consistent with the requirements for shipping other Class 9 hazardous materials. The final rule's specified compliance time is critically important to protect passengers and crewmembers from a potential accident or incident and should be required at the earliest possible date. We therefore support the proposed compliance date of no later than 75 days after publication of the final rule.

Cost/Benefit Analysis

Undoubtedly, the NPRM will have a financial impact on battery manufacturers and those involved in the shipping of batteries and the electronic devices that they power. We note, however, that the DOT proposes to include lithium batteries in an existing regulatory system that has been used safely for decades to transport other types of hazardous materials. Costs associated with hazardous materials packaging, labeling, pilot-notification and training are incurred every day when thousands of commodities, such as flammable paint, air bags and dry ice are shipped by air. If even one major hull loss accident or the loss of one life can be prevented through the provisions proposed in this NPRM, the costs will have been well justified. Since the NPRM's provisions are the same as those applicable to dozens of other commodities, ALPA believes it reasonable and fair that the battery industry bear the costs of shipping their products safely.

Summary of ALPA Recommendations

To ensure the safety of flight when shipments of lithium batteries are transported on passenger and cargo-only aircraft, ALPA recommends that PHMSA:

1. Adopt new, proper shipping names for lithium metal batteries (including lithium alloy) and lithium ion batteries (including lithium polymer), as proposed.
2. Adopt a new watt-hour description in place of equivalent lithium content for lithium ion batteries, as proposed.
3. Adopt changes to design type tests, including a requirement for an internal short circuit test (if a reliable one can be developed), as proposed.
4. Adopt the requirement to retain evidence of satisfactory completion of design type tests, as proposed.
5. Adopt the requirement to mark batteries that have successfully passed the design type tests required by the hazardous materials regulations, as proposed.

6. Eliminate regulatory exceptions for most lithium battery shipments, as proposed. This will result in lithium battery shipments being prepared and shipped as fully regulated Class 9 hazardous materials, including requirements for packaging, labeling, an acceptance check, pilot notification and training.
7. Limit the proposed exception to button cell batteries when packed with or contained in equipment.
8. Allow the ICAO lithium battery handling label in addition to a Class 9 label, as proposed.
9. Adopt a requirement to completely enclose a lithium cell or battery in an inner packaging, as proposed.
10. Adopt provisions to permit an operator to carry lithium batteries and lithium battery powered equipment in the cabin, as proposed.
11. Adopt a new requirement to transport batteries at a reduced state of charge to improve the margin of safety for lithium battery shipments, but do not use state of charge to justify relaxing any regulatory requirement.
12. Conduct new testing on fully charged lithium ion and lithium metal batteries packaged for transport to determine the safe quantity of batteries that may be carried in Class C, Class D, and Class E cargo compartments.
13. Until testing is complete, adopt a conservative limit for the number of lithium batteries permitted in a single cargo compartment.
14. Extend the current prohibition of lithium metal batteries aboard passenger aircraft to cargo-only aircraft until adequate packaging can be developed to protect the batteries from damage, external fire or high heat source, and to prevent a fire involving a single lithium metal battery from spreading.
15. Do not adopt accessibility requirements for lithium ion batteries in lieu of transportation in a Class C cargo compartment.
16. Do not adopt accessibility requirements for lithium metal batteries.
17. Adopt the compliance date of 75-days following the publication of a final rule, as proposed.

Docket No. PHMSA-2009-0095 (HM-224F), HM Transportation of Lithium Batteries
Air Line Pilots Association, International
March 12, 2010
Page 12

Conclusion

ALPA recommends that the NPRM be adopted with the inclusion of the changes articulated in our response. We applaud the PHMSA and the Department of Transportation for this rulemaking and agree that it will significantly enhance the safety of transporting lithium battery shipments, particularly via air transportation. If we can offer further clarification or assistance, please contact me directly at mark.rogers@ALPA.org or ALPA Senior Staff Engineer Rick Kessel (703/689-4202, rick.kessel@ALPA.org).

Thank you for providing ALPA the opportunity to comment on this important NPRM.

Sincerely,

A handwritten signature in black ink, appearing to read 'MR', with a stylized flourish extending to the right.

Mark Rogers,
Director, Dangerous Goods Programs

MMR:rk