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DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

[Docket No. PHMSA-2009-0310; Notice No. 09-05]

Advisory Guidance; Transportation of Batteries and Battery-Powered Devices

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), DOT.

ACTION: Safety advisory.

SUMMARY: The Pipeline and Hazardous Materials Safety Administration (PHMSA) and the Federal Aviation Administration (FAA) are alerting shippers and carriers to the importance of transporting lithium batteries safely. PHMSA and FAA are concerned that many persons who ship lithium batteries do not recognize the hazards posed by these batteries during transportation. We are issuing this advisory guidance to (1) Inform persons of recent aviation incidents involving fires aboard both passenger and cargo aircraft and the potential hazards that shipments of lithium batteries may present while in transportation, (2) provide information concerning the current requirements for the transportation of lithium batteries and (3) inform persons of the actions we have taken to date and plan to take in the future to address the hazards of these batteries.

SUPPLEMENTARY INFORMATION:

I. Background

Lithium batteries are considered hazardous materials in transportation because they present both chemical (e.g., flammable electrolytes) and electrical hazards. If not safely packaged and handled when transported, lithium batteries can become dangerous.

Defective batteries or batteries that are misused, mishandled, improperly packaged, improperly stored, improperly manufactured, or overcharged 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. Fires in aircraft can result in catastrophic events presenting unique challenges not encountered in other transport modes.

II. Recent Transportation Incidents

Since 1991, we have identified over 40 air transport-related incidents involving lithium batteries and devices powered by lithium batteries. A list of these incidents can be found on the FAA Web site at: http://www.faa.gov/about/office_org/headquarters_offices/ash/ash_programs/hazmat/aircarrier_info/media/Battery_incident_chart.pdf. These incidents occurred aboard passenger aircraft and cargo aircraft, prior to loading batteries aboard an aircraft, and after batteries were transported by air. Many of the incidents were directly related to a lack of awareness of the required safety measures applicable to shipments of lithium batteries or because passengers failed to follow preventative measures to protect batteries from short circuit or damage.

On September 9, 2009 a passenger flight declared an emergency after a passenger attempted to hand the flight attendant a carrier-provided personal electronic device (PED). The PED was dropped and upon impact with the cabin floor the battery pack sparked and began smoking. Two flight attendants extinguished the fire with water.

On August 25, 2009 DOT received information related to a smoking and burning package that was discovered at a Medford, Massachusetts sorting facility. Upon inspection, the consignment was discovered to contain 30 individual batteries grouped together in six or seven battery packs. The package contained lithium batteries that were shipped as general cargo. There were no markings or labels on the outer package indicating the material was a hazardous material.

On August 15, 2009 a package containing lithium ion batteries was found smoldering, and emitting smoke in a unit load device (ULD) in an aircraft loading facility in Taipei, Taiwan. The ULD had been carried from the Island of Macau. Personnel in the Taiwan facility responded quickly to extinguish the smoldering fire before any open flames were seen. The packages were unmarked and the contents were noted on the invoice as ``electrical adapters.''

On August 14, 2009 after landing the aircraft, the flight crew received a warning indicating smoke in the forward cargo compartment. Initial indications are that a fire originated with a shipment of approximately 1,000 e-cigarettes, each containing a lithium metal battery. There were no markings or labels indicating the materials posed a specific hazard or contained lithium batteries.

On July 15, 2009 one of several related packages transported from Romulus, Michigan was discovered emitting smoke and smoldering upon arrival in Santo Domingo, Dominican Republic. Upon inspection, the package was found to contain numerous loose lithium-ion cell phone batteries haphazardly packed with no apparent measures to protect against short-circuits or overheating. Package documentation indicated, ``used batteries--non haz.''

III. Current Regulatory Requirements

The Hazardous Materials Regulations (HMR; 49 CFR parts 171-180) include requirements for packaging, hazard communication and handling lithium batteries. For transportation by all modes, lithium batteries of all types and sizes must pass a series of tests outlined in the UN Manual of Tests and Criteria. These tests are designed to ensure the battery can withstand the conditions typically encountered in transportation. In addition, all batteries must be packaged to prevent short circuits, including movement that could lead to short circuits and damage to the batteries (See Sec. 172.102(c) SP 188, 189 and Sec. 173.185). The HMR also impose additional restrictions on the transport of lithium batteries in the air mode, including a limited prohibition on the transport of lithium metal batteries as cargo on board passenger aircraft (See Sec. 172.102(c) SP A100). Additionally, damaged, defective or recalled lithium batteries (including those being returned to the manufacturer as part of a safety recall) should not be transported aboard aircraft. Recommended practices for preparing recalled batteries for ground transportation are set forth in ``DOT Guidance for the Safe Transportation of Recalled Lithium Batteries,'' available for download at http://safetravel.dot.gov/downloads.html.

While certain small lithium batteries and cells are afforded exceptions from some regulatory requirements, the cells and batteries must be separated or packaged in a manner to prevent short circuits (See Sec. 172.102(c) SP 188 and 189). When a package contains multiple lithium cells or batteries, the package must be:

Marked to indicate that it contains lithium batteries and that special procedures should be followed in the event the package is damaged;

Accompanied by a document indicating that the package contains lithium batteries and special procedures should be followed in the event that the package is damaged;

Capable of withstanding a 1.2 meter drop test in any orientation without damage to cells or batteries contained in the package, without shifting of the contents that would allow short circuits and without release of package contents; and

Not more than 30 kg (66 pounds) gross mass.

In addition all electrical devices that are likely to create sparks or generate a dangerous quantity of heat are forbidden for transportation unless packaged in a manner that precludes such an occurrence (See Sec. 173.21).

IV. Current and Future Efforts

To enhance understanding and compliance with the HMR, we initiated several public outreach efforts designed to connect with both the travelling public and the larger shipping community. Since 2007 we have published numerous safety advisories, created the SafeTravel Web site dedicated to providing information to the air travelling public on the safe transport of a variety of materials including lithium batteries and partnered with airlines, battery manufacturers and others to spread our safety message. Additionally, the PHMSA Hazardous Materials Safety Assistance Team initiated an outreach campaign. As part of this campaign, team members visited retailers and others involved in the production, distribution and sale of lithium batteries. During their visits, team members provided kits on how to provide information on the safe shipment of lithium batteries and encouraged those persons the team visited to include the SafeTravel link on their Web sites. In March 2009, DOT published ``Shipping Batteries Safely by Air; What You Need to Know,'' targeting infrequent shippers who may be unfamiliar with appropriate packing methods. This guide explains the regulations covering the classification, packaging and hazard communication requirements for the transportation of batteries shipped by aircraft in terms easy to understand.

Despite these outreach efforts, aviation incidents involving lithium batteries continue to occur. For example, the July 15, 2009 incident involved a shipment containing several thousand lithium ion cell phone batteries loosely placed into fiberboard packages, with no protection from short circuits and no package markings indicating the presence of lithium batteries. One of the packages was discovered emitting smoke after landing at its destination. These and similar incidents are the cause of significant concern by PHMSA and FAA. Documents included with the shipment indicated the packages contained non-hazardous used batteries.

Non-compliance with the transportation requirements for lithium batteries poses serious safety consequences. Therefore, we are again increasing our efforts to reduce this risk by stepping up our already aggressive enforcement of the safety standards and reenergizing our awareness and outreach efforts. Accordingly, we are publishing this safety advisory to further promote awareness of the ongoing safety concern and ensure that shippers and carriers are aware of the risks associated with the transportation of lithium batteries, the current regulatory requirements applicable to such transportation, and that regulatory violations will be prosecuted to the maximum extent permitted under the law. We are particularly concerned with undeclared shipments of lithium batteries and we will be focusing on discovering these shipments and those persons responsible for offering them in transportation. We encourage anyone with information on those engaged in this practice to bring them to our attention through our online complaints Web site at: http://www.phmsa.dot.gov/phmsa-ext/feedback/hazmatComplaintsRegsViolationsForm.jsp or by calling the Hazardous Materials Information Center at: 1-800-467-4922.

Persons who violate the HMR may be subject to significant civil penalties and/or criminal fines and imprisonment. In determining the amount of a civil penalty the following factors will be determined: (1) The nature, circumstances, extent, and gravity of the violation; (2) with respect to the violator, the degree of culpability, and history of prior violations, the ability to pay, and any effect on the ability to continue to do business; and (3) other matters that justice requires.
Maximum civil penalties may be imposed of up to $50,000 per violation or $100,000 per violation if a death, serious illness, or severe injury occurs to a person or substantial destruction of property.

Potential criminal penalties include fines of up to $500,000 and/or ten years in jail. In a recent enforcement case, PHMSA assessed a total civil penalty of

$360,000 for multiple violations of the HMR relating to the improper shipment of used batteries for recycling or disposal.
To date, FAA has closed over 75 investigations concerning battery violations observed in air transport and has collected over $1,000,000 in civil penalties.

More detailed information on the requirements in the HMR governing the shipment of batteries and additional guidance are available on DOT's Hazmat Safety Web site: http://www.phmsa.dot.gov/hazmat. The HMR are also accessible through our Web site, and answers to specific questions may be obtained from the Hazardous Materials Information Center at 1-800-467-4922 (in Washington, DC, call 202-366-4488).

Issued in Washington, DC, on September 29, 2009.
Theodore L. Willke,
Associate Administrator for Hazardous Materials Safety.
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