U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

Safety Advisory Notice for the Disposal and Recycling of
Lithium Batteries in Commercial Transportation
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Office of Hazardous Materials Safety

Why PHMSA Wrote this Safety Advisory Notice

PHMSA wants to increase the public's overall awareness about the dangers related to shipping lithium batteries for recycling or disposal. Lithium batteries — including both lithium metal and lithium ion batteries — can cause a fire, whether they are new, used, defective, or damaged. Shippers and carriers need to take extra, and sometimes different, precautions when shipping damaged, defective, or recalled lithium batteries, as opposed to new and used lithium batteries or batteries of other chemistries. In addition to complying with the general shipping requirements, anyone offering a lithium battery for commercial transportation should also assess the potential fire hazards in transport. This safety advisory outlines regulatory requirements for proper and safe shipment in commercial transportation for all lithium batteries intended for disposal or recycling and includes specific requirements for lithium batteries that are damaged, defective, or have been recalled.

During recent compliance inspections, PHMSA's hazardous materials (HAZMAT) investigators routinely saw shippers and carriers improperly package and ship lithium batteries for disposal or recycling. Such dangerous practices included packaging lithium batteries in a way that did not prevent short circuits, mixing damaged lithium batteries with

other batteries in the same packaging within shipments for disposal or recycling, and shipping pallet loads of batteries in boxes and drums with inappropriate identification of the packages' contents.

The contents of this safety advisory do not have the force and effect of law and are not meant to bind the public in any way. The safety advisory is intended only to provide information to the public regarding existing requirements under the Hazardous Materials Regulations (HMR; 49 CFR parts 171-180).

What this Safety Advisory Notice Does

- Summarizes the regulatory information needed for shipping lithium batteries in commercial transportation for recycling and disposal.
- Discusses the general dangers of shipping lithium batteries, what consumers should do, and steps shippers and carriers need to take when disposing and recycling lithium batteries and equipment/products containing lithium batteries.
- Directs readers to a variety of additional resources for further information on preparing lithium batteries for shipment.

This Safety Advisory Notice is for Anyone Who

- Prepares shipments for the disposal or recycling of lithium batteries.
- Commercially transports used, damaged, defective, or recalled lithium batteries.
- Disposes of lithium batteries.
- Recycles lithium batteries.
- Uses equipment/products that employ or contain lithium batteries.

For Consumers

What Consumers Should Do with Used, Damaged, Defective, or Recalled Lithium Batteries

Consumers should take used lithium batteries to recycling or household hazardous waste collection points. Consumers should **NOT** throw out lithium batteries in household garbage or recycling bins.

What Consumers Should Do with Recalled Equipment/Products

If a lithium battery or equipment/products containing a lithium battery has a recall notice, consumers should follow the manufacturer's safety instructions and disposal instructions. In addition, consumers should pay attention to any warnings from the manufacturer.

For Shippers and Carriers

What Shippers and Carriers Need to Know About Lithium Battery Commercial Transportation Regulations

The safe shipment of lithium batteries in commercial transportation depends on complying with the HMR and using good judgment, regardless of quantity shipped. Lithium batteries pose a fire hazard, even when no longer useful in powering consumer equipment/products. Shippers and carriers need to be careful to ensure lithium batteries do not create sparks or generate a dangerous quantity of heat, and are otherwise safe for transport [see § 173.21(c)]. The HMR in § 173.185(d) explains how to ship lithium batteries, including those contained in or packed with equipment destined for disposal or recycling. Shipments of damaged, defective, or recalled lithium batteries have even more restrictions than newly-manufactured, used, or undamaged/properly functioning batteries because they are more likely to ignite [see § 173.185(f)].

How to Properly Ship Lithium Batteries for Disposal or Recycling

Shippers must package any lithium battery shipped for disposal or recycling in a manner that prevents short circuiting and damage to the battery or its terminals in transportation [see § 173.185(b)]. This may be achieved by packing each battery in a fully enclosed inner packaging made of electrically non-conductive material and separating the batteries from each other and other electrically conductive material within the same package. Additionally, lithium batteries must be packaged in a manner to prevent damage caused by shifting or placement of the batteries in the package.

Protection against short circuiting, damage, and accidental activation are important aspects of packaging. Common methods of protecting batteries against short circuits include placing the cells or batteries in plastic bags or covering exposed terminals. Rather than prescribing the exact package configuration, PHMSA regulations use a performance standard that allows shippers a degree of flexibility in how batteries are packed, provided the requirements are met [see § 173.185(b)].

Inner packagings containing lithium batteries shipped for disposal or recycling may be placed into a strong outer packaging instead of a specification outer packaging. A strong outer packaging is sturdy, durable, and constructed so that it will retain its contents under normal conditions of transportation. Normal conditions of transportation include changes in temperature and humidity, shocks, loadings, and vibrations from package handling and transport. Common examples of strong outer packagings are sturdy fiberboard, metal, or plastic boxes, drums, and gaylord boxes [see Part 173, Subpart B]. Note: for undamaged batteries, multiple batteries may be placed into a single inner packaging, and multiple inner

packagings may be placed into the same strong outer packaging, provided the batteries remain protected from short circuits and damage.

Finally, lithium batteries that are damaged such that they have the potential to create sparks or generate a dangerous evolution of heat are subject to additional packaging and hazard communication requirements identified in § 173.185(f) and discussed in greater detail below.

How to Identify Damaged, Defective, or Recalled Lithium Batteries

Damaged, defective, or recalled lithium batteries and equipment/products containing these lithium batteries must follow the requirements in § 173.185(f). Shippers and carriers must separately package damaged, defective, or recalled lithium batteries from other batteries shipped for disposal or recycling. Damaged, defective, or recalled batteries have greater potential than undamaged lithium batteries to short circuit, to release heat, or even to cause a fire.

Consumers can find information about recalls of lithium batteries and equipment/products containing them at the following resources:

- www.recalls.gov
- www.cpsc.gov/recalls

To determine whether a lithium battery is defective, damaged, or subject to a recall, a person should rely on a technical expert with knowledge of the battery's safety features and information from the equipment/product manufacturer. Some criteria to consider when assessing whether a lithium battery is damaged or defective include, but are not limited to:

- Batteries known to be defective or that have been recalled by their manufacturer.
- Batteries that have leaked or vented.
- Batteries suspected of being damaged but cannot be diagnosed.

- Batteries showing signs of physical or mechanical damage, such as:
    - Swelling, relative to the same battery in its original state.
    - Discoloration of the battery casing.
    - Smell or corrosion.
    - Loose or damaged wires.
    - Known conditions of use or misuse.

How to Properly Ship Damaged, Defective, or Recalled Lithium Batteries

Damaged, defective, or recalled lithium batteries may be shipped only by highway, rail, or vessel transportation. These batteries are strictly forbidden for commercial transportation by aircraft [see § 173.185(f)]. Here are some details explaining how to properly ship damaged, defective, and recalled lithium batteries:

- Place the battery in an individual, non-metallic inner packaging that completely encloses the battery.
- Surround the inner packaging with non-combustible, electrically non-conductive, and absorbent cushioning material.
- Place each inner packaging into its own specification outer packaging rated to the Packing Group I performance level. This means only one damaged, defective, or recalled battery per inner packaging, and only one inner packaging per outer packaging.
- Mark the outer packaging with "Damaged/defective" and identify the battery type. The marking — reading "Damaged/defective lithium ion battery" or "Damaged/defective lithium metal battery" — must be in characters at least 12 mm

(0.47 inches) high. This marking is in addition to any other required package markings and labels discussed in the section immediately below.

How to Properly Mark and Label a Lithium Battery Package for Disposal or Recycling

Each completed package containing lithium batteries or equipment/products must display the appropriate markings and labels [see § 173.185].These markings and labels alert transportation workers, including hazmat employees, throughout the supply chain of the presence of lithium batteries, of the need to handle them properly, and the measures to take in the event of an emergency. PHMSA's Lithium Battery Guide for Shippers contains more detailed guidance on preparing packages of lithium batteries in various configurations and shipping scenarios.

Packages containing lithium batteries must have proper hazard communication. In general, packages containing lithium batteries shipped in accordance with the HMR require the Class 9 lithium battery label as found in § 172.447 and depicted in Figure 1.

Figure 1. Class 9 Lithium Battery Label

Some shipments of smaller lithium batteries and equipment/products may qualify for limited flexibility under § 173.185(c). Common equipment/products that may qualify for this provision include cell phones, tablets, notebook computers, small children's toys, and

handheld power tools. Only certain shipments may qualify for this provision; for more details on what shipments may qualify under this narrow provision, see PHMSA's Lithium Battery Guide for Shippers.

Shipments that comply with the requirements of § 173.185(c) still require hazard communication, including the lithium battery mark depicted in Figure 2, with the appropriate UN identification number and a telephone number to call for additional information about the shipment [see § 185(c)(3)(i)].

Figure 2. Lithium Battery Mark

Required Emergency Response Information

Persons preparing shipments of hazardous materials — including lithium batteries — generally must include emergency response information on the shipping paper or on an accompanying separate document [see § 172.602]. The shipping paper must have an emergency response telephone number [see § 172.604]. This telephone number must include the area code or international access code and be monitored at all times while the hazardous material is in transportation or in storage incidental to transportation. The person monitoring the emergency response telephone number must either: 1) be knowledgeable of the hazardous material being shipped and have comprehensive emergency response and incident mitigation

information for that material, or 2) have immediate access to a person who possesses such knowledge and information. This means the person should be able to assist first responders at the scene of an incident involving lithium batteries, with knowledge of fire or explosion hazards, protective clothing required, and evacuation distances. To best assist emergency responders at the scene of the incident, emergency response information must include:

- The basic description and technical name of the hazardous material.
    - For example, "UN3480, Lithium ion batteries, 9" or "UN3090, Lithium metal batteries, 9."
- Immediate hazards to health.
- Risks of fire or explosion.
- Immediate precautions to be taken in the event of an accident or incident.
- Immediate methods for handling fires.
- Initial methods for handling spills or leaks in the absence of fire.
- Preliminary first aid measures.

Emergency response information requirements may not be applicable to shippers and carriers transporting qualifying shipments of "smaller" lithium batteries, per § 173.185(c).

HAZMAT Training Requirements

Who needs HAZMAT training?

The HMR impose training requirements that are generally applicable to any employee who prepares, packages, offers, or transports lithium batteries for recycling or disposal [see §§ 172.700 through 172.704]. Training requirements may not be applicable to shippers and carriers transporting qualifying shipments of "smaller" lithium batteries in accordance with § 173.185(c).

Which HAZMAT training is necessary?

HAZMAT training [§ 172.704(a)] includes the following components:

- General awareness/familiarization.
- Function-specific training.
- Safety.
- Security awareness.

A training program from another Federal or state agency that includes these four HAZMAT components can fulfill the HMR training requirements [§ 172.704(a)]. More information on training requirements is available from the PHMSA website: https://www.phmsa.dot.gov/training/hazmat/training-requirements-industry.

Who is responsible for providing training?

Each entity that employs individuals who prepare, package, offer, or transport lithium batteries is responsible for:

- Providing training for its employees who prepare, package, offer, or transport lithium batteries (hazmat employees).
- Testing its hazmat employees.
- Certifying its hazmat employees' training.
- Developing, maintaining, and retaining its hazmat employees' training records.
    - Records must be kept for each hazmat employee for the following time frames:
        - Three years from the date of the last training; and,
        - 90 days after the hazmat employee has left the company.

Special Permits for Shipping Lithium Batteries

PHMSA has issued special permits for packaging designs meant to handle damaged, defective, or recalled batteries. A special permit allows a person to deviate from specific HMR requirements while maintaining an equivalent level of safety. A person applying for a special permit must demonstrate that the requested special permit achieves a level of safety at least equal to that required by the regulatory provision from which they seek a deviation [see § 107.105(d)]. A person who holds a special permit must comply with the special permit's requirements. The outside of each package authorized by a special permit is marked "DOT-SP" followed by the special permit number assigned. Anyone can search for the special permit number on the PHMSA special permits search page using the special permit number.

Environmental Protection Agency Hazardous Waste Requirements

Lithium batteries may meet the definition of hazardous waste under the Resource Conservation and Recovery Act if they exhibit a characteristic of hazardous waste such as ignitability, reactivity, or toxicity when they are disposed. The Environmental Protection Agency recommends that lithium batteries be managed under the streamlined federal "universal waste" regulations in 40 CFR Part 273. Requirements include instructions on how to manage the waste, how to label containers, how long the waste can be accumulated on site, and where the waste can be sent, among others. More information on the proper management and disposal of lithium batteries is available from https://www.epa.gov/recycle/used-lithium-ion-batteries.

Additional Lithium Battery Resources from PHMSA

PHMSA created additional resources on lithium battery regulations, which complement this safety advisory notice. These resources include:

- PHMSA's website: https://www.phmsa.dot.gov/lithiumbatteries.
- PHMSA's Lithium Battery Guide for Shippers.
- PHMSA's recorded presentation on how to use the Lithium Battery Guide for Shippers.
- PHMSA's Hazardous Materials Information Center
    - Telephone number: 1-800-467-4922
    - E-mail: infocntr@dot.gov
    - The HAZMAT Info Center is staffed Monday through Friday, 9:00 a.m. to 5:00 p.m. Eastern Time. If you contact the Info Center outside of normal business hours, leave a message and someone will return your call the next business day.
- PHMSA's Online CFR tool (oCFR).
    - You can click on the link labeled "oCFR Tool" on the menu on the left under "Related Links."

Issued in Washington, D.C., on May 17, 2022.

William S. Schoonover,
Associate Administrator, Office of Hazardous Materials Safety
Pipeline and Hazardous Materials Safety Administration.