

BATTERY PACKAGING GUIDELINES

These guidelines for packaging batteries have been developed in an effort to provide customers with instructions on how to safely package and ship batteries for recycling or disposal. By following these proper packaging methods, any potential hazards will be minimized while the batteries are accumulated at the generator's location as well as during transportation to a recycling or disposal facility.

Historically, there were several incidents reported where a fire occurred as a result of small batteries being improperly packed in a drum. The goal is to assure that all batteries are properly packaged, and, therefore, the risk of such an incident occurring is minimized.

All batteries pose potential hazards during transportation; therefore, it is imperative that all batteries comply with the proper US Department of Transportation (US DOT) packaging requirements that are referenced in this document. These guidelines were specifically developed to address the shipment of batteries by highway, rail and cargo vessel. Additional requirements may apply to air shipments.

General Guidelines applicable to ALL batteries, regardless of type or size:

- Only chemically compatible battery types should be packed in the same package. Do not mix acidic batteries with alkaline batteries.
- To prevent short circuiting, the US DOT has identified the following methods as acceptable methods of short circuit protection:
 1. Packaging each battery or each battery-powered device when practicable, in fully enclosed inner packaging made of non-conductive material;
 2. Separating or packaging batteries and battery-powered devices in a manner to prevent contact with other batteries, devices or conductive materials (e.g., metal) in the packaging; or
 3. Ensuring exposed terminals are protected with non-conductive caps, non-conductive tape, or by other appropriate means. Proper insulation includes taping the terminals of the batteries or packaging in individual plastic bags. Clear tape is preferred so that battery identification is still possible. Other forms of insulation may also be used.
- To prevent damage to terminals the US DOT has identified the following methods as acceptable methods for protecting battery terminals:
 1. Securely attaching covers of sufficient strength to protect the terminals;
 2. Packaging the battery in a rigid plastic packaging; or
 3. Constructing the battery with terminals that are recessed.
 4. Cushioning and packaging the batteries to prevent shifting which could loosen terminal caps or reorient the terminals.
- All methods employed to protect from short circuit and to protect the terminals of the batteries must be adequate to withstand conditions normally incident to transportation.
- All batteries should be stored in a cool, dry environment.
- Leaking batteries must be individually packaged and may require shipment as an EPA hazardous waste.
- Batteries secured to a pallet in accordance with 49 CFR §173.159(d)(1) are considered to be a single non-bulk package even if the completed package weighs more than 400 kg (882 pounds). Therefore, marking and labeling should be in accordance with the non-bulk packaging requirements found under 49 CFR, Subpart D – Marking and Subpart E – Labeling.
- Incident reporting in accordance with §171.16 is required for ALL incidents involving shipments of batteries or battery-powered devices including fire, violent rupture, explosion, or a dangerous evolution of heat. This requirement applies to all battery shipments, including batteries that are prepared as excepted from the HMR requirements.

EXCEPTION FOR SPENT BATTERIES OF THE TYPE "BATTERIES, DRY, SEALED, N.O.S." WITH A MARKED RATING OF 9-VOLTS OR LESS

As clarified in a US DOT interpretation letter dated November 25, 2009, used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." and are not specifically covered by another proper shipping name, with a marked rating up to 9-volts are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volts or less that are combined in the same package and

transported by highway or rail for recycling, reconditioning, or disposal are not subject to the regulation and do not require terminal protection or protection against short circuiting.

Health and Safety Considerations:

Many batteries contain toxic and/or corrosive materials. While intact, these batteries do not pose a health or safety hazard during use. However, if a battery becomes damaged there is a potential for exposure to these hazardous materials. If a battery becomes damaged or begins to leak consult a Material Safety Data Sheet from the manufacturer of the battery to obtain applicable health and safety data.

Battery Specific information:

The following pages contain specific packaging requirements for the most common battery types currently available. If you have a specialty battery that is not identified in the following guidelines please contact your customer service representative for specific packaging requirements (i.e. special use batteries, thermal batteries, etc.).

The battery specific packaging information contained in this document is strictly to be used as guidance when packaging batteries. Per US DOT regulation and agency guidance documents, any electrical device, even one not otherwise subject to the HMR (either by specific exception from the HMR, or because the device and its power source contains no material meeting the definition of a hazardous material), is forbidden from being offered for transportation, or transported, if the device is likely to create sparks or a dangerous evolution of heat, unless packaged in a manner that precludes such an occurrence.

For some batteries the packaging guidelines contained within this document may be more stringent than the US DOT packaging requirements. If circumstances dictate the use of a packaging method that is authorized by the USDOT but not listed in this document is required, authorization must be obtained from the Veolia Corporate Transportation Department.

Exceptions to these packaging procedures must be approved in advance. Packaging policy exceptions will only be approved when it can be shown that (1) the alternative packaging scenario complies with USDOT requirements, and (2) the packaging required by company policy is not feasible or practical to use given the unique characteristics of the batteries or the customer project.

The document will be amended as additional information regarding battery packaging is available.



When preparing battery shipments for transportation the effects of shifting and vibration caused during transportation and subsequent handling must always be considered!

The guidelines below do not apply to batteries with recessed terminals in which damage to the terminals or short circuits would not occur or to batteries that fall under the exception for 9-volts or less.

PREVENT SHORT CIRCUITS

All batteries with exposed terminals must be protected against short circuits by one of the following methods:

- Reattach the manufacturer's original terminal caps/covers and further secure the covers in place with tape if loose or seem likely to fall off during transportation/handling
- Non-conductive tape or other appropriate material may be used to insulate the terminals against short-circuits. The tape or protective covering must be of sufficient durability and adhered in a manner that it remains intact and abrasion-free during transportation/handling.

BATTERIES PACKED IN OUTER CONTAINERS

Multiple (chemically compatible) batteries may be packed together in a single outer packaging in accordance with the following requirements:

- Each battery must be placed in a plastic bag (one battery per bag). The bag must be sealed and of sufficient strength/thickness and must be durable enough to resist tearing and abrasions during transportation/handling
- Batteries must be placed in an upright position and secured from movement within the outer container
- The outer container must be constructed of a material that is non-conductive and compatible with the battery chemistry
- The total weight of the outer packaging must not exceed the weight rating tested for the container

BATTERIES LOADED ONTO A PALLET

When loading batteries onto a pallet for transportation the following requirements must be followed:

- Batteries must be stacked on the pallet with the terminals protected from short-circuits with non-conductive caps, tape or other insulating material and facing away from touching terminals of other batteries
- Layers of batteries with top facing terminals should be stacked in a manner that will protect the terminals from damage or breakage. Heavy batteries should always be placed on the lowest level to prevent crushing. Layers should be separated by waffle board or sheets of cardboard for stabilization and to help prevent short circuits.
- Batteries must be secured against movement or shifting on the pallet by nailing wooden cleats to the pallet. Plastic banding or shrink-wrap of sufficient strength should be wrapped around the completed pallet to secure the batteries in place. Banding must not be in a position in which it will come in contact with the battery terminals. When using non-conductive banding to secure batteries to pallets, precautions should be taken to assure any metal clips used to connect the banding straps do not come in contact with exposed battery terminals.
- Pallets must be of good integrity with no broken or loose boards and must be sturdy and durable enough to handle the weight of the battery load.

ALKALINE



TYPICAL USES: Flashlights, cameras, portable radios, audio players, and toys.

COMPOSITION: Alkaline batteries have a zinc anode and a manganese dioxide cathode. The electrolyte used in an alkaline battery is a paste of either potassium hydroxide or sodium hydroxide. Each of these components, along with conductors and separators are then assembled into or contained within a hermetically sealed unit. Typical household size alkaline battery is a 1.5 volt (AA, AAA, C, D).

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, dry, sealed, n.o.s.
Hazard Class	N/A (NONE)
Identification Number	N/A
Packing Group	N/A

US DOT PACKAGING REQUIREMENTS: 49 CFR §172.102 Special Provision 130

All dry cell batteries other than those excepted below must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in strong outer packagings or, if large enough, firmly secured to pallets capable of withstanding the shocks normally incident to transportation.

EXCEPTION FOR SPENT BATTERIES OF THE TYPE "BATTERIES, DRY, SEALED, N.O.S." WITH A MARKED RATING OF 9-VOLTS OR LESS

As clarified in a USDOT interpretation letter dated November 25, 2009, used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." and are not specifically covered by another proper shipping name, with a marked rating up to 9-volts are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volts or less that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to the regulation and do not require terminal protection or protection against short circuiting.

NOTE: Multiple 1.5-volt alkaline batteries interconnected or grouped in series are not included in this exception and must continue to be packaged in accordance with SP130 (terminals must be protected against damage and short circuits).

US EPA REGULATIONS: Since this class of battery does not fail the TCLP nor does it contain any free liquids, it is not classified as a hazardous waste as defined by the US EPA and as such, is not subject to the universal waste requirements. Individual states may adopt more stringent regulations than the federal regulations; therefore, alkaline batteries may be classified as a universal waste in some states.

LEAD ACID, WET CELL



TYPICAL USES: Automotive, marine, industrial applications.

COMPOSITION: Lead acid batteries have a lead anode and a lead dioxide cathode. The electrolyte is an aqueous solution of sulfuric acid. The battery cell contains 60 to 75 percent lead and lead oxide, by weight, and the electrolyte contains between 28 and 51 percent sulfuric acid, by weight.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, wet, filled with acid
Hazard Class	8
Identification Number	UN2794
Packing Group	PG III

US DOT PACKAGING REQUIREMENTS: 49 CFR §173.159

All lead acid batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in USDOT authorized packaging's which include:

Non-Bulk Containers:

- Specification packages listed in 49 CFR §173.159(c). The most common of these containers are the 4G fiberboard box, the 1G fiberboard drum and the 1H2 poly drum. Metal drums are not authorized for shipping wet cell batteries,
- To prohibit battery movement within drums or boxes, the use of folded cardboard, "honeycomb" cardboard or other bulky packing materials should be utilized. The use of vermiculite, floor dry or other granular absorbents is not recommended and may be subject to additional charges.
- Batteries must be shipped in an upright configuration and must be secured within the package to prevent the battery from reorienting in transport.
- **1H2 poly drums larger than 5 gallons should not be used for the transport of lead acid batteries.** As an alternative, multiple, larger-sized batteries should be secured to pallets for transport or packaged in lined 1G fiberboard drums.

Palletized Batteries:

- When secured to a pallet for transport, non-conductive strapping must be used. **Metal banding is not permissible due to the potential risk of short circuiting.** When using non-conductive banding to secure batteries to pallets, precautions should be taken to assure any metal clips used to connect the banding straps do not come in contact with exposed battery terminals.
- Firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation. The pallet must not exceed a height of 1.5 times the width of the pallet and must be capable of withstanding a superimposed weight of 2 times the weight of the pallet. The battery terminals must not be relied upon to support any of the superimposed weight and must not short out if a conductive material is placed in direct contact with them,

US EPA REGULATIONS: Rules specific to the recycling of lead acid batteries are contained in 40 CFR part 266 Subpart G. As an alternative to this section, generators of lead acid batteries may choose to manage their lead acid batteries in accordance with the universal waste standards. When managed as a universal waste, each battery or each package containing batteries must be marked with the words "Universal Waste Batteries," "Waste Batteries," or "Used Batteries."

Broken or damaged batteries that no longer qualify for either the recycling exemption or the universal waste exemption must be managed as a hazardous waste. The RCRA waste codes D002 and D008 apply when the batteries or containers hold liquid electrolyte. The RCRA waste code D008 only applies to batteries or containers that have no liquids within them.

LEAD ACID, NON-SPILLABLE
(Valve Regulated Lead Acid)



TYPICAL USES: Camcorders, computers, portable radios, lawn equipment, portable industrial equipment, marine applications

COMPOSITION: Like wet cell lead acid batteries, non-spillable or Valve Regulated Lead Acid (VRLA) batteries also have a lead anode, a lead dioxide cathode, and an aqueous sulfuric acid electrolyte. However, because of the way in which non-spillable batteries are manufactured, the electrolyte will not spill out of the battery. Although somewhat of a misnomer, these batteries are often referred to as sealed lead acid batteries. There are two primary categories of non-spillable batteries:

1. Absorbed glass mat (AGM) batteries, these batteries contain a liquid electrolyte that is absorbed into a glass mat sandwiched between the electrodes.
2. Gel cell batteries, these are batteries which have a chemical added to the electrolyte which causes it to form a gel which will not spill from the battery.

Non-spillable batteries authorized to be shipped under the below listed shipping name and packaging standards must be clearly marked "NONSPILLABLE" or "NONSPILLABLE BATTERY" by the manufacturer.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, wet, non-spillable
Hazard Class	8
Identification Number	UN2800
Packing Group	PG III

US DOT PACKAGING REQUIREMENTS: 49 CFR §173.159 or 49 CFR §173.159a

As an alternative to the packaging requirements of 49 CFR §173.159, non-spillable lead acid batteries may be prepared and packaged in accordance with 49 CFR §173.159a. (See 'Lead Acid, Wet Cell' guidelines for the packaging requirements of 49 CFR §173.159.) For non-spillable batteries packaged under 49 CFR §173.159a, the batteries must be packaged in strong outer packages and must be prepared in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

The batteries and outer packaging must be plainly and durable marked "NONSPILLABLE" or "NONSPILLABLE BATTERY".

Additional Packaging Requirements:

1. **1H2 poly drums larger than 5 gallons should not be used for the transport of lead acid batteries.** As an alternative, larger quantities of small non-spillable batteries should be packaged in lined 1G fiberboard drums.
2. Larger batteries, comparable to an automotive battery should be packaged following the packaging requirements of 49 CFR §173.159. (See the 'Lead Acid, Wet Cell' guidelines for packaging requirements of 49 CFR §173.159)
3. Batteries must be shipped in an upright configuration and must be packaged to prevent the battery from reorienting in transport.

4. To secure batteries within drums or boxes, the use of folded cardboard, "honeycomb" cardboard or other bulky packing materials should be utilized. The use of vermiculite, floor dry or other granular absorbents is not recommended and may be subject to additional charges.

US EPA REGULATIONS: Rules specific to the recycling of lead acid batteries are contained in 40 CFR part 266 Subpart G. As an alternative to this section, generators of lead acid batteries may choose to manage their lead acid batteries in accordance with the universal waste standards. When managed as a universal waste, each battery or each package containing batteries must be marked with the words "Universal Waste Batteries," "Waste Batteries," or "Used Batteries."

Broken or damaged batteries that no longer qualify for either the recycling exemption or the universal waste exemption must be managed as a hazardous waste. The RCRA waste codes D002 and D008 apply when the batteries or containers hold liquid electrolyte. The RCRA waste code D008 applies only to batteries or containers that have no liquids within them.

LITHIUM, LITHIUM POLYMER and LITHIUM ION



TYPICAL USES: Cameras, calculators, watches, computers, etc.

COMPOSITION: The table below lists several of the most common types of lithium batteries.

ANODE	CATHODE	ELECTROLYTE	CATEGORY OF BATTERY
Lithium	Manganese Dioxide	Lithium perchlorate in an organic solvent*	Primary/Non-rechargeable
Lithium	Iron Sulfide	Organic solvent*	Primary/Non-rechargeable
Lithium	Thionyl Chloride	Lithium tetrachloroaluminate in thionyl chloride	Primary/Non-rechargeable
Lithium	Sulfur Dioxide	Lithium bromide in sulfur dioxide and acetonitrile	Primary/Non-rechargeable
Graphite	Metal oxide/salts**	Lithium salts in an organic solvent*	Secondary/Rechargeable

*Organic solvents may include one or more of the following: propylene carbonate, dioxolane, dimethoxyethane, ethylene carbonate

** Common metal oxides include lithium cobalt oxide, lithium manganese oxide and lithium iron phosphate.

US DOT DESCRIPTION:

Proper Shipping Name	Lithium Battery
Hazard Class	9
Identification Number	UN3090
Packing Group	PG II

US DOT PACKAGING REQUIREMENTS: 49 CFR §173.185

All lithium batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Lithium batteries and cells shipped for disposal or recycling must be packaged in strong outer packagings. (49 CFR §173.185(d)).

Additional exceptions for small and medium sized lithium cells/batteries – Relief from certain DOT requirements can be found in 49 CFR §172.102 Special Provisions 188 and 189.

US EPA REGULATIONS: Lithium metal is a water reactive metal. As such lithium batteries should be managed as a universal waste in accordance with 40 CFR Part 273. All containers of universal waste batteries must be marked with the words “Universal Waste Batteries,” “Waste Batteries,” or “Used Batteries.”

MAGNESIUM

TYPICAL USES: Same as alkaline

COMPOSITION: Magnesium batteries have a magnesium anode, manganese dioxide cathode, and an electrolyte of a paste containing magnesium bromide or magnesium perchlorate with a chromate inhibitor to prevent corrosion to the magnesium anode. Each of these components, along with conductors and separators are then typically assembled into or contained within a hermetically sealed unit. If the battery is not a hermetically sealed unit, the battery should be considered a specialty battery and the following information is not applicable. For assistance in determining the proper packaging for these specialty batteries please contact customer service.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, dry, sealed, n.o.s.
Hazard Class	N/A (NONE)
Identification Number	N/A
Packing Group	N/A

US DOT PACKAGING REQUIREMENTS: 49 CFR §172.102 Special Provision 130

All dry cell batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in strong outer packagings or, if large enough, firmly secured to pallets capable of withstanding the shocks normally incident to transportation.

EXCEPTION FOR SPENT BATTERIES OF THE TYPE "BATTERIES, DRY, SEALED, N.O.S." WITH A MARKED RATING OF 9-VOLTS OR LESS

As clarified in a USDOT interpretation letter dated November 25, 2009, used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." and are not specifically covered by another proper shipping name, with a marked rating up to 9-volts are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volts or less that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to the regulation and do not require terminal protection or protection against short circuiting.

US EPA REGULATIONS: Based on the original composition and charge state of the battery, these batteries may fail the TCLP for chromium. As such magnesium batteries should be managed as a universal waste in accordance with 40 CFR Part 273. All containers of universal waste batteries must be marked with the words "Universal Waste Batteries," "Waste Batteries," or "Used Batteries."

MERCURY



TYPICAL USES: Hearing aids, pacemakers, camera, calculators, watches, etc.

COMPOSITION: Mercury batteries have a zinc anode and a mercuric oxide cathode. The electrolyte used in a mercury battery is a paste of either potassium hydroxide or sodium hydroxide. Each mercury cell contains a total of 20 to 50 percent mercury by weight. Each of these components, along with conductors and separators are then assembled into or contained within a hermetically sealed unit.

US DOT DESCRIPTION:

Packages containing less than 3 pounds of mercury batteries

Proper Shipping Name	Batteries, dry, sealed, n.o.s.
Hazard Class	N/A
Identification Number	N/A
Packing Group	N/A

US DOT PACKAGING REQUIREMENTS: 49 CFR §172.102 Special Provision 130

All dry cell batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in strong outer packagings.

Packages which contain greater than 3 pounds of mercury batteries meet the US DOT definition of a hazardous substance and must be prepared for transport in accordance with the US DOT regulations using the proper shipping name "RQ Environmentally hazardous substance solid, n.o.s. (Mercury)".

EXCEPTION FOR SPENT BATTERIES OF THE TYPE "BATTERIES, DRY, SEALED, N.O.S." WITH A MARKED RATING OF 9-VOLTS OR LESS

As clarified in a USDOT interpretation letter dated November 25, 2009, used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." and are not specifically covered by another proper shipping name, with a marked rating up to 9-volts are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volts or less that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to the regulation and do not require terminal protection or protection against short circuiting.

US EPA REGULATIONS: Mercury batteries typically fail the TCLP for mercury. As such, all mercury batteries should be managed as a universal waste in accordance with 40 CFR Part 273. All containers of universal waste batteries must be marked with the words "Universal Waste Batteries," "Waste Batteries," or "Used Batteries."

When not shipped as universal waste, the RCRA Waste code D009 (mercury) would need to be included on the manifest.

NICKEL CADMIUM WET CELL



TYPICAL USES: Industrial applications, back up batteries and computers

COMPOSITION: Nickel cadmium (NiCd) batteries have a cadmium anode and a nickel oxyhydroxide cathode. The electrolyte within a wet cell NiCd battery is an aqueous solution of potassium hydroxide.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, wet, filled with alkali
Hazard Class	8
Identification Number	UN2795
Packing Group	PG III

US DOT PACKAGING REQUIREMENTS: 49 CFR §173.159

All wet cell NiCad batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in US DOT authorized packaging's which include:

1. Specification packages listed in §173.159(c). The most common of these containers are the 4G fiberboard box and the 1H2 poly drum. Metal drums are not authorized for shipping wet cell batteries,
2. Firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation. The pallet must not exceed a height of 1.5 times the width of the pallet and must be capable of withstanding a superimposed weight of 2 times the weight of the pallet. The battery terminals must not be relied upon to support any of the superimposed weight and must not short out if a conductive material is placed in direct contact with them,
3. In accordance with one of the other packaging alternatives not specifically listed above.

US EPA REGULATIONS: Wet cell NiCd batteries contain a liquid electrolyte which exhibits the characteristic of corrosivity and when tested will fail the TCLP for cadmium. As such, wet cell NiCd batteries should be managed as a universal waste in accordance with 40 CFR Part 273. All containers of universal waste batteries must be marked with the words "Universal Waste Batteries," "Waste Batteries," or "Used Batteries."

When not shipped as a universal waste, the RCRA Waste code D002 (Corrosivity) and D006 (cadmium) would need to be included on the manifest.

NICKEL CADMIUM, DRY CELL



TYPICAL USES: Cameras, rechargeable appliances such as portable power tools, hand held vacuums, etc.

COMPOSITION: Dry cell nickel cadmium (NiCd) batteries have a cadmium anode and nickel oxyhydroxide cathode. The electrolyte used in a dry cell NiCd battery is a paste of potassium hydroxide. Each of these components, along with conductors and separators are then assembled into or contained within a hermetically sealed unit.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, dry, sealed, n.o.s.
Hazard Class	N/A
Identification Number	N/A
Packing Group	N/A

US DOT PACKAGING REQUIREMENTS: 49 CFR §172.102 Special Provision 130

All dry cell batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in strong outer packagings or, if large enough, firmly secured to pallets capable of withstanding the shocks normally incident to transportation.

EXCEPTION FOR SPENT BATTERIES OF THE TYPE "BATTERIES, DRY, SEALED, N.O.S." WITH A MARKED RATING OF 9-VOLTS OR LESS

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US EPA REGULATIONS: Dry cell NiCd batteries typically will fail the TCLP for cadmium. As such, dry cell NiCd batteries should be managed as a universal waste in accordance with 40 CFR Part 273. All containers of universal waste batteries must be marked with the words "Universal Waste Batteries," "Waste Batteries," or "Used Batteries."

When not shipped as a universal waste, the RCRA Waste code D006 (cadmium) would need to be included on the manifest.

NICKEL METAL HYDRIDE



TYPICAL USES: Cameras, rechargeable appliances such as portable power tools, hand held vacuums, etc.

COMPOSITION: Nickel metal hydride (NiMH) batteries have a hydrogen-absorbing metal alloy anode and a nickel oxyhydroxide cathode. The electrolyte in a NiMH battery is typically a potassium hydroxide paste. Each of these components, along with conductors and separators are then assembled into or contained within a hermetically sealed unit.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, dry, sealed, n.o.s.
Hazard Class	N/A
Identification Number	N/A
Packing Group	N/A

US DOT PACKAGING REQUIREMENTS: 49 CFR §172.102 Special Provision 130

All dry cell batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in strong outer packagings or, if large enough, firmly secured to pallets capable of withstanding the shocks normally incident to transportation.

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US EPA REGULATIONS: Since this class of battery does not fail the TCLP nor does it contain any free liquids, it is not classified as a hazardous waste as defined by the US EPA and as such, is not subject to the universal waste requirements. Individual states may adopt more stringent regulations than the federal regulations; therefore, NiMH batteries may be classified as a universal waste in some states.

SILVER OXIDE



TYPICAL USES: Hearing aids, watches, cameras, calculators

COMPOSITION: Silver oxide batteries have a zinc anode and a silver oxide cathode. The electrolyte used in a silver oxide battery is a potassium hydroxide or sodium hydroxide paste. Each of these components, along with conductors and separators are then assembled into or contained within a hermetically sealed unit. In addition to the above materials, many of the older silver oxide batteries contained a significant amount of mercury. Batteries containing both silver and mercury should be managed as mercury batteries. The below listed information is for non-mercury containing silver oxide batteries.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, dry, sealed, n.o.s.
Hazard Class	N/A
Identification Number	N/A
Packing Group	N/A

US DOT PACKAGING REQUIREMENTS: 49 CFR §172.102 Special Provision 130

All dry cell batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in strong outer packagings or, if large enough, firmly secured to pallets capable of withstanding the shocks normally incident to transportation.

EXCEPTION FOR SPENT BATTERIES OF THE TYPE "BATTERIES, DRY, SEALED, N.O.S." WITH A MARKED RATING OF 9-VOLTS OR LESS

As clarified in a USDOT interpretation letter dated November 25, 2009, used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." and are not specifically covered by another proper shipping name, with a marked rating up to 9-volts are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volts or less that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to the regulation and do not require terminal protection or protection against short circuiting.

US EPA REGULATIONS: Silver oxide batteries typically will fail the TCLP for silver and older silver oxide batteries will typically fail the TCLP for silver and mercury. As such, silver oxide batteries should be managed as a universal waste in accordance with 40 CFR Part 273. All containers of universal waste batteries must be marked with the words "Universal Waste Batteries," "Waste Batteries," or "Used Batteries."

When not shipped as a universal waste, the RCRA Waste code D011 (silver) would need to be included on the manifest.

CARBON ZINC



TYPICAL USES: Flashlights, toys, etc.

COMPOSITION: Carbon zinc batteries, often referred to as Heavy Duty Batteries, have a zinc anode and a cathode that contains a mixture of manganese dioxide, carbon and electrolyte. The batteries also contain a carbon electrode that serves as a cathode current collector. The electrolyte is an aqueous solution of ammonium chloride and zinc chloride or a solution of zinc chloride. The electrolyte is mixed the other components of the battery to form a paste. Each of these components, along with conductors and separators are then assembled into or contained within a hermetically sealed unit.

US DOT DESCRIPTION:

Proper Shipping Name	Batteries, dry, sealed, n.o.s.
Hazard Class	N/A (NONE)
Identification Number	N/A
Packing Group	N/A

US DOT PACKAGING REQUIREMENTS: 49 CFR §172.102 Special Provision 130

All dry cell batteries must be prepared and packaged in a manner to prevent:

1. A dangerous evolution of heat,
2. Short circuits, and
3. Damage to terminals

Batteries must be packaged in strong outer packaging's or, if large enough, firmly secured to pallets capable of withstanding the shocks normally incident to transportation.

EXCEPTION FOR SPENT BATTERIES OF THE TYPE "BATTERIES, DRY, SEALED, N.O.S." WITH A MARKED RATING OF 9-VOLTS OR LESS

As clarified in a USDOT interpretation letter dated November 25, 2009, used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." and are not specifically covered by another proper shipping name, with a marked rating up to 9-volts are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volts or less that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to the regulation and do not require terminal protection or protection against short circuiting.

US EPA REGULATIONS: Since this class of battery does not fail the TCLP nor does it contain any free liquids, it is not classified as a hazardous waste as defined by the US EPA and as such, is not subject to the universal waste requirements. Individual states may adopt more stringent regulations than the federal regulations; therefore, carbon zinc batteries may be classified as a universal waste in some states.

APPENDIX

The following contains excerpts from the US DOT regulations, 49 CFR Part 171-173, that are referenced in the guidance document.

§172.102, SPECIAL PROVISION 130 “Batteries, dry, sealed, n.o.s.,” commonly referred to as dry batteries, are hermetically sealed and generally utilize metals (other than lead) and/or carbon as electrodes. These batteries are typically used for portable power applications. The rechargeable (and some non-rechargeable) types have gelled alkaline electrolytes (rather than acidic) making it difficult for them to generate hydrogen or oxygen when overcharged and therefore, differentiating them from non-spillable batteries. Dry batteries specifically covered by another entry in the §172.101 Table must be transported in accordance with the requirements applicable to that entry. For example, nickel-metal hydride batteries transported by vessel in certain quantities are covered by another entry (see Batteries, nickel-metal hydride, UN3496). Dry batteries not specifically covered by another entry in the §172.101 Table are covered by this entry (i.e., Batteries, dry, sealed, n.o.s.) and are not subject to requirements of this subchapter except for the following:

(a) Incident reporting. For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat (i.e., an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a dry battery. For all modes of transportation, a written report submitted, retained, and updated in accordance with §171.16 is required if a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a dry battery or battery-powered device.

(b) Preparation for transport. Batteries and battery-powered device(s) containing batteries must be prepared and packaged for transport in a manner to prevent:

- (1) A dangerous evolution of heat;
- (2) Short circuits, including but not limited to the following methods:
 - (i) Packaging each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material;
 - (ii) Separating or packaging batteries in a manner to prevent contact with other batteries, devices or conductive materials (e.g., metal) in the packaging’s; or
 - (iii) Ensuring exposed terminals or connectors are protected with non-conductive caps, non-conductive tape, or by other appropriate means; and
- (3) Damage to terminals. If not impact resistant, the outer packaging should not be used as the sole means of protecting the battery terminals from damage or short circuiting. Batteries must be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals to produce short circuits. Batteries contained in devices must be securely installed. Terminal protection methods include but are not limited to the following:
 - (i) Securely attaching covers of sufficient strength to protect the terminals;
 - (ii) Packaging the battery in a rigid plastic packaging; or
 - (iii) Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

(c) Additional air transport requirements. For a battery whose voltage (electrical potential) exceeds 9 volts-

- (1) When contained in a device, the device must be packaged in a manner that prevents unintentional activation or must have an independent means of preventing unintentional activation (e.g., packaging restricts access to activation switch, switch caps or locks, recessed switches, trigger locks, temperature sensitive circuit breakers, etc.); and
- (2) An indication of compliance with this special provision must be provided by marking each package with the words “not restricted” or by including the words “not restricted” on a transport document such as an air waybill accompanying the shipment.

(d) Used or spent battery exception. Used or spent dry batteries of both non-rechargeable and rechargeable designs, with a marked rating up to 9-volt that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to this special provision or any other requirement of the HMR. Note that batteries utilizing different chemistries (i.e.,

those battery chemistries specifically covered by another entry in the §172.101 Table) as well as dry batteries with a marked rating greater than 9-volt may not be combined with used or spent batteries in the same package. Note also that this exception does not apply to batteries that have been reconditioned for reuse.

§172.102, SPECIAL PROVISION 188 Small lithium cells and batteries. Lithium cells or batteries, including cells or batteries packed with or contained in equipment, are not subject to any other requirements of this subchapter if they meet all of the following:

a. Primary lithium batteries and cells.

(1) Primary lithium batteries and cells are forbidden for transport aboard passenger-carrying aircraft. The outside of each package that contains primary (nonrechargeable) lithium batteries or cells must be marked "PRIMARY LITHIUM BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" or "LITHIUM METAL BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" on a background of contrasting color. The letters in the marking must be:

(i) At least 12 mm (0.5 inch) in height on packages having a gross weight of more than 30 kg (66 pounds); or

(ii) At least 6 mm (0.25 inch) on packages having a gross weight of 30 kg (66 pounds) or less, except that smaller font may be used as necessary to fit package dimensions; and

(2) The provisions of paragraph (a)(1) do not apply to packages that contain 5 kg (11 pounds) net weight or less of primary lithium batteries or cells that are contained in or packed with equipment and the package contains no more than the number of lithium batteries or cells necessary to power the piece of equipment;

b. For a lithium metal or lithium alloy cell, the lithium content is not more than 1.0 g. For a lithium-ion cell, the equivalent lithium content is not more than 1.5 g;

c. For a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2.0 g. For a lithium-ion battery, the aggregate equivalent lithium content is not more than 8 g;

d. Effective October 1, 2009, the cell or battery must be of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter);

e. Cells or batteries are separated or packaged in a manner to prevent short circuits and are packed in a strong outer packaging or are contained in equipment;

f. Effective October 1, 2008, except when contained in equipment, each package containing more than 24 lithium cells or 12 lithium batteries must be:

(1) Marked to indicate that it contains lithium batteries, and special procedures should be followed if the package is damaged;

(2) Accompanied by a document indicating that the package contains lithium batteries and special procedures should be followed if the package is damaged;

(3) 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 circuiting and without release of package contents; and

(4) Gross weight of the package may not exceed 30 kg (66 pounds). This requirement does not apply to lithium cells or batteries packed with equipment;

g. Electrical devices must conform to §173.21;

h. For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat (i.e. , an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a lithium battery. For all modes of transportation, a written report submitted, retained, and updated in accordance with §171.16 is required if a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a lithium battery or battery-powered device; and

i. Lithium batteries or cells are not authorized aboard an aircraft in checked or carry-on luggage except as provided in §175.10.

§172.102, SPECIAL PROVISION 189 Medium lithium cells and batteries. Effective October 1, 2008, when transported by motor vehicle or rail car, lithium cells or batteries, including cells or batteries packed

with or contained in equipment, are not subject to any other requirements of this subchapter if they meet all of the following:

- a. The lithium content anode of each cell, when fully charged, is not more than 5 grams.
- b. The aggregate lithium content of the anode of each battery, when fully charged, is not more than 25 grams.
- c. The cells or batteries are of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). A cell or battery and equipment containing a cell or battery that was first transported prior to January 1, 2006 and is of a type proven to meet the criteria of Class 9 by testing in accordance with the tests in the UN Manual of Tests and Criteria, Third revised edition, 1999, need not be retested.
- d. Cells or batteries are separated or packaged in a manner to prevent short circuits and are packed in a strong outer packaging or are contained in equipment.
- e. The outside of each package must be marked "LITHIUM BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL" on a background of contrasting color, in letters:
 - (1) At least 12 mm (0.5 inch) in height on packages having a gross weight of more than 30 kg (66 pounds); or
 - (2) At least 6 mm (0.25 inch) on packages having a gross weight of 30 kg (66 pounds) or less, except that smaller font may be used as necessary to fit package dimensions.
- f. Except when contained in equipment, each package containing more than 24 lithium cells or 12 lithium batteries must be:
 - (1) Marked to indicate that it contains lithium batteries, and special procedures should be followed if the package is damaged;
 - (2) Accompanied by a document indicating that the package contains lithium batteries and special procedures should be followed if the package is damaged;
 - (3) 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 circuiting and without release of package contents; and
 - (4) Gross weight of the package may not exceed 30 kg (66 pounds). This requirement does not apply to lithium cells or batteries packed with equipment.
- g. Electrical devices must conform to §173.21 of this subchapter; and
- h. A written report submitted, retained, and updated in accordance with §171.16 is required if a fire, violent rupture, explosion or dangerous evolution of heat (i.e. , an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a lithium battery or battery-powered device.

§172.102, SPECIAL PROVISION 190 Until the effective date of the standards set forth in Special Provision 189, medium lithium cells or batteries, including cells or batteries packed with or contained in equipment, are not subject to any other requirements of this subchapter if they meet all of the following:

- a. Primary lithium batteries and cells . (1) Primary lithium batteries and cells are forbidden for transport aboard passenger-carrying aircraft. The outside of each package that contains primary (nonrechargeable) lithium batteries or cells must be marked "PRIMARY LITHIUM BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" or "LITHIUM METAL BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" on a background of contrasting color. The letters in the marking must be:
 - (i) At least 12 mm (0.5 inch) in height on packages having a gross weight of more than 30 kg (66 pounds); or
 - (ii) At least 6 mm (0.25 inch) on packages having a gross weight of 30 kg (66 pounds) or less, except that smaller font may be used as necessary to fit package dimensions; and
- (2) The provisions of paragraph (a)(1) do not apply to packages that contain 5 kg (11 pounds) net weight or less of primary lithium batteries or cells that are contained in or packed with equipment and the package contains no more than the number of lithium batteries or cells necessary to power the piece of equipment.
- b. The lithium content of each cell, when fully charged, is not more than 5 grams.
- c. The aggregate lithium content of each battery, when fully charged, is not more than 25 grams.

- d. The cells or batteries are of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). A cell or battery and equipment containing a cell or battery that was first transported prior to January 1, 2006 and is of a type proven to meet the criteria of Class 9 by testing in accordance with the tests in the UN Manual of Tests and Criteria, Third Revised Edition, 1999, need not be retested.
- e. Cells or batteries are separated so as to prevent short circuits and are packed in a strong outer packaging or are contained in equipment.
- f. Electrical devices must conform to §173.21 of this subchapter.

§172.102, SPECIAL PROVISION 237 “Batteries, dry, containing potassium hydroxide solid, *electric storage*” must be prepared and packaged in accordance with the requirements of §173.159(a), (b), and (c). For transportation by aircraft, the provisions of §173.159(b)(2) are applicable.

§173.21(c) Forbidden materials and packages

(c) Electrical devices, such as batteries and battery-powered devices, which are likely to create sparks or generate a dangerous evolution of heat, unless packaged in a manner which precludes such an occurrence.

§173.159 Batteries, wet

(a) Electric storage batteries, containing electrolyte acid or alkaline corrosive battery fluid (wet batteries), may not be packed with other materials except as provided in paragraphs (g) and (h) of this section and in §§173.220 and 173.222; and any battery or battery-powered device must be prepared and packaged for transport in a manner to prevent:

- (1) A dangerous evolution of heat (i.e. , an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence);
- (2) Short circuits, including, but not limited to:
 - (i) Packaging each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material;
 - (ii) Separating or packaging batteries and battery-powered devices in a manner to prevent contact with other batteries, devices or conductive materials (e.g. , metal) in the packaging's; or
 - (iii) Ensuring exposed terminals are protected with non-conductive caps, non-conductive tape, or by other appropriate means; and
- (3) Damage to terminals. If not impact resistant, the outer packaging must not be used as the sole means of protecting the battery terminals from damage or short circuiting. Batteries must be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals. Batteries contained in devices must be securely installed. Terminal protection methods include but are not limited to:
 - (i) Securely attaching covers of sufficient strength to protect the terminals;
 - (ii) Packaging the battery in a rigid plastic packaging; or
 - (iii) Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

173.159a Exceptions for non-spillable batteries

(a) Exceptions for hazardous materials shipments in the following paragraphs are permitted only if this section is referenced for the specific hazardous material in the §172.101 table or in a packaging section in this part.

(b) Non-spillable batteries offered for transportation or transported in accordance with this section are subject to the incident reporting requirements. For transportation by aircraft, a telephone report in accordance with §171.15(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat (i.e. , an amount of heat sufficient to be dangerous to packaging or personal safety to include charring of packaging, melting of packaging, scorching of packaging, or other evidence) occurs as a direct result of a non-spillable battery. For all modes of transportation, a written report in accordance with §171.16(a) is required if a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a non-spillable battery.

(c) Non-spillable batteries are excepted from the packaging requirements of §173.159 under the following conditions:

(1) Non-spillable batteries must be securely packed in strong outer packaging's and meet the requirements of §173.159(a). A non-spillable battery which is an integral part of and necessary for the operation of mechanical or electronic equipment must be securely fastened in the battery holder on the equipment;

(2) The battery and outer packaging must be plainly and durably marked "NON-SPILLABLE" or "NON-SPILLABLE BATTERY." The requirement to mark the outer package does not apply when the battery is installed in a piece of equipment that is transported unpackaged.

(d) Non-spillable batteries are excepted from all other requirements of this subchapter when offered for transportation and transported in accordance with paragraph (c) of this section and the following:

(1) At a temperature of 55 °C (131 °F), the battery must not contain any unabsorbed free-flowing liquid, and must be designed so that electrolyte will not flow from a ruptured or cracked case; and

(2) For transport by aircraft, when contained in a battery-powered device, equipment or vehicle must be prepared and packaged for transport in a manner to prevent unintentional activation in conformance with §173.159(b)(2) of this Subpart.

§173.185 Lithium cells and batteries

(a) Cells and batteries. A lithium cell or battery, including a lithium polymer cell or battery and a lithium-ion cell or battery, must conform to all of the following requirements:

(1) Be of a type proven to meet the requirements of each test in the UN Manual of Tests and Criteria (IBR; see §171.7 of this subchapter). A cell or battery and equipment containing a cell or battery that was first transported prior to January 1, 2006 and is of a type proven to meet the criteria of Class 9 by testing in accordance with the tests in the UN Manual of Tests and Criteria, Third Revised Edition, 1999, need not be retested.

(2) Incorporate a safety venting device or otherwise be designed in a manner that will preclude a violent rupture under conditions normally incident to transportation.

(3) Be equipped with an effective means to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.) if a battery contains cells or series of cells that are connected in parallel.

(4) Be packaged in combination packaging's conforming to the requirements of part 178, subparts L and M, of this subchapter at the Packing Group II performance level. The lithium battery or cell must be packed in inner packaging's in such a manner as to prevent short circuits, including movement which could lead to short circuits. The inner packaging must be packed within one of the following outer packaging's: metal boxes (4A or 4B); wooden boxes (4C1, 4C2, 4D, or 4F); fiberboard boxes (4G); solid plastic boxes (4H2); fiber drums (1G); metal drums (1A2 or 1B2); plywood drums (1D); plastic jerricans (3H2); or metal jerricans (3A2 or 3B2).

(5) Be equipped with an effective means of preventing external short circuits.

(6) Except as provided in paragraph (d) of this section, cells and batteries with a liquid cathode containing sulfur dioxide, sulfuryl chloride or thionyl chloride may not be offered for transportation or transported if any cell has been discharged to the extent that the open circuit voltage is less than two volts or is less than 2/3 of the voltage of the fully charged cell, whichever is less.

(b) Lithium cells or batteries packed with equipment. Lithium cells or batteries packed with equipment may be transported as Class 9 materials if the batteries and cells meet all the requirements of paragraph (a) of this section. The equipment and the packages of cells or batteries must be further packed in a strong outer packaging. The cells or batteries must be packed in such a manner as to prevent short circuits, including movement that could lead to short circuits.

(c) Lithium cells or batteries contained in equipment . Lithium cells or batteries contained in equipment may be transported as Class 9 materials if the cells and batteries meet all the requirements of paragraph (a) of this section, except paragraph (a)(4) of this section, and the equipment is packed in a strong outer packaging that is waterproof or is made waterproof through the use of a liner unless the equipment is made waterproof by nature of its construction. The equipment and cells or batteries must be secured within the outer packaging and be packed so as to prevent movement, short circuits, and accidental operation during transport.

(d) Cells and batteries, for disposal or recycling. A lithium cell or battery offered for transportation or transported by motor vehicle to a permitted storage facility, disposal site or for purposes of recycling is excepted from the specification packaging requirements of paragraph (a)(4) of this section and the

requirements of paragraphs (a)(1) and (a)(6) of this section when protected against short circuits and packed in a strong outer packaging conforming to the requirements of §§173.24 and 173.24a.

(e) Shipments for testing (prototypes). A lithium cell or battery is excepted from the requirements of (a)(1) of this section when transported by motor vehicle for purposes of testing. The cell or battery must be individually packed in an inner packaging, surrounded by cushioning material that is non-combustible and nonconductive. The cell or battery must be transported as a Class 9 material.

(f) A lithium cell or battery that does not comply with the provisions of this subchapter may be transported only under conditions approved by the Associate Administrator.

(g) Batteries employing a strong, impact-resistant outer casing and exceeding a gross weight of 12 kg (26.5 lbs.), and assemblies of such batteries, may be packed in strong outer packaging's, in protective enclosures (for example, in fully enclosed wooden slatted crates) or on pallets. Batteries must be secured to prevent inadvertent movement, and the terminals may not support the weight of other superimposed elements. Batteries packaged in this manner are not permitted for transportation by passenger aircraft, and may be transported by cargo aircraft only if approved by the Associate Administrator prior to transportation.



U.S. Department of Transportation
**Pipeline and Hazardous Materials
Safety Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

NOV 25 2009

Mr. George Kerchner
Wiley Rein LLP
1776 K Street NW
Washington, DC 20006

Ref. No. 09-0112R

Dear Mr. Kerchner:

Recently, our Office issued several letters, including our June 23, 2009 letter (Ref. No. 09-0112) responding to your request, regarding the applicability of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) to the transport of used or spent dry cell batteries. This letter supersedes the response given in our June 23, 2009 letter.

After further consideration and analysis of dry battery chemistries and sizes and based on information available to us, it is the opinion of this Office that used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." in the Hazardous Materials Table in § 172.101 of the HMR and not specifically covered by another proper shipping name, with a marked rating up to 9-volt are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volt or less that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to the HMR. Note that batteries utilizing different chemistries (i.e., those battery chemistries specifically covered by another proper shipping name) as well as dry, sealed batteries with a marked rating greater than 9-volt may not be combined with used or spent batteries of the type "Batteries, dry, sealed, n.o.s." in the same package. Note also, that the clarification provided in this letter does not apply to batteries that have been reconditioned for reuse.

I hope this information is helpful. If you have further questions, please contact this office.

Sincerely,

Charles E. Betts,
Chief, Standards Development
Office of Hazardous Materials Standards

Key Definitions:

Anode - The electrode where oxidation occurs in an electrochemical cell. It is the negative electrode on a battery.

Battery - A device consisting of one or more electrically connected electrochemical cells which is designed to receive, store, and deliver electric energy.

Cathode - The electrode where reduction occurs in an electrochemical cell. It is the positive electrode on a battery.

Cell - A system consisting of an anode, cathode, and an electrolyte, plus such connections (electrical and mechanical) as may be needed to allow the cell to deliver or receive electrical energy.

Electrolyte - A chemical compound (salt, acid, or base) that dissociates into electrically charged ions when dissolved in a solvent. The resulting electrolyte (or electrolytic) solution is an ionic conductor of electricity.

Hermetically sealed - A device or unit that is sealed and for practical purposes is considered airtight.

Primary cells and batteries - Non-rechargeable cells and batteries.

Secondary cells and batteries - Rechargeable cells and batteries.