UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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OFFICE OF
LAND AND EMERGENCY
MANAGEMENT

Subject: Lithium Battery Recycling Regulatory Status and Frequently Asked Questions

From: Carolyn Hoskinson, Director
Office of Resource Conservation and Recovery

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CAROLYN HOSKINSON
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To: LCRD Division Directors, Regions 1–10

The purpose of this memorandum is to clarify how the hazardous waste regulations for universal waste and recycling apply to lithium-ion batteries. The proportion of electric cars powered by lithium-ion batteries on the road is rising rapidly; lithium-ion batteries also power our electronics and, increasingly, lawnmowers, e-scooters, electric bicycles, and many other devices. The growth of the circular economy for lithium battery materials is vital as the focus turns to how to eventually manage lithium-ion batteries at the end of their lives. Recycling lithium-ion batteries returns valuable critical minerals to the economy, both conserving resources and reducing the overall energy use needed to produce new batteries.

Recent interest in the regulation and management of lithium-ion batteries at end of life has prompted the EPA to examine specifically how universal waste handling requirements, hazardous waste recycling regulations, and other RCRA Subtitle C provisions apply to this waste stream. Today the Agency is clarifying that most lithium-ion batteries are likely hazardous waste at end of life and that they can be managed under the streamlined hazardous waste management standards for universal waste until they reach a destination facility for recycling or discard.[1] The frequently asked questions attached to this memorandum also describe how RCRA recycling regulations apply to lithium-ion batteries. EPA encourages the recycling of lithium-ion batteries wherever possible in a manner that protects communities and the environment. By clarifying how battery recycling is regulated, ORCR hopes to both remove uncertainties for the states and industry about the regulatory status of these materials and processes and to ensure that this critical step in the circular economy is done safely and compliantly. Throughout this memorandum, when we refer to batteries, we mean lithium-ion batteries.

Lithium-ion Batteries

Rechargeable lithium-ion batteries are experiencing rapid increase in demand, as they are very energy dense—storing high amounts of energy in a battery that is smaller and lighter than other chemistries—and are therefore being used in many consumer electronic, electric vehicle, and stationary storage applications.

[1] The universal waste standards in 40 CFR part 273 are for certain hazardous wastes that are generated by a wide variety of establishments and are meant to streamline the collection of these hazardous wastes for proper management at a hazardous waste recycler or a permitted treatment, storage, or disposal facility.

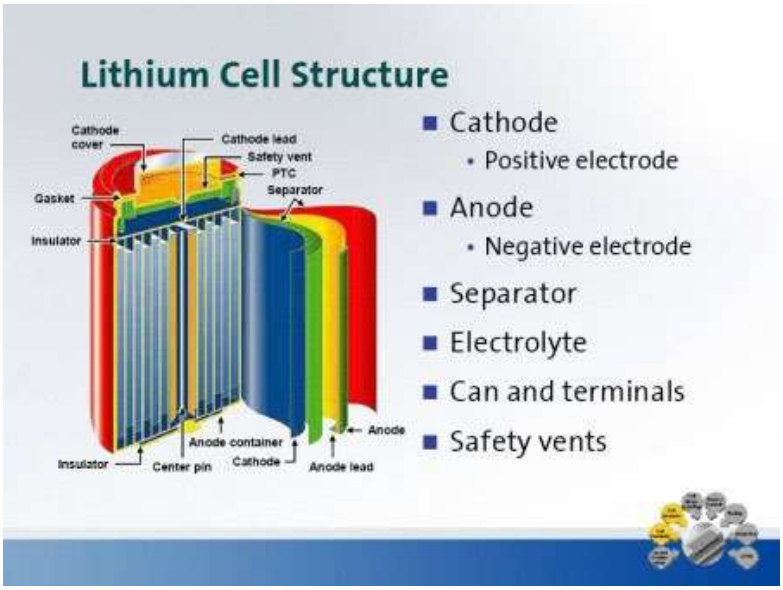

Figure 1: Lithium-ion battery cell structure

Source: https://www.autoblog.com/2007/03/14/general-motors-talks-about-battery-development/

Lithium-ion battery designs and chemistries vary considerably depending on the needs of the application they are used in. Figure 1 illustrates a common design for a lithium-ion battery cell. The cell contains an anode layer, a cathode layer, and a separator, all of which are in contact with an electrolyte, which is most often a liquid. These components are stacked or rolled together and placed in an outer packaging—either a steel can or an aluminum/polymer pouch material is common. Figure 2 presents an example of what percentage of a battery is made up of each of the component parts. The battery in this example has a lithium nickel cobalt aluminum oxide (NCA) cathode, commonly used in electric vehicles.

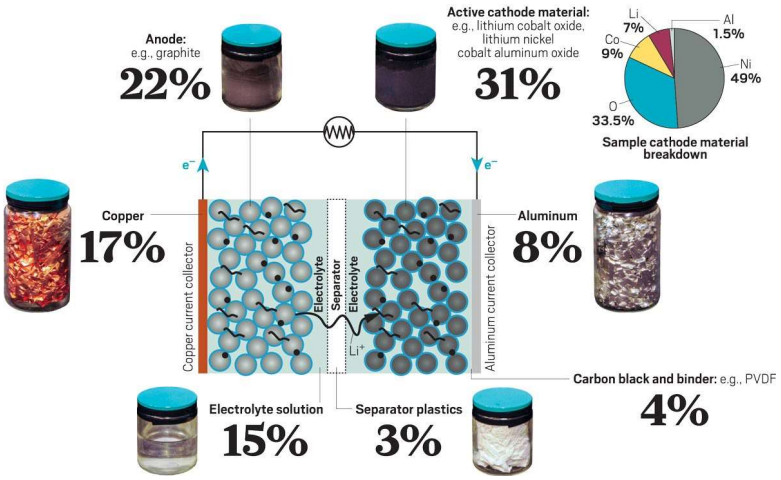

Figure 2. Inside a Li-Ion Battery (with an NCA cathode)

Source: Argonne National Lab, published in Jacoby, M., 2019. "It's time to get serious about recycling lithium-ion batteries." Chemical & Engineering News, Volume 97, Issue 28. July 14, 2019. Available online at https://cen.acs.org/materials/energy-storage/time-serious-recycling-lithium/97/i28.

Although the materials used for each of these components of the battery vary, common materials used are lithium, nickel, cobalt, manganese, graphite, iron, copper and aluminum foils, and an electrolyte that is frequently flammable and RCRA ignitable. According to the United States Geological Survey's 2022 list, of these commonly used materials, aluminum, lithium, nickel, cobalt, manganese, and graphite are all critical minerals.[2] Lithium-ion batteries of different chemistries will differ in how much total energy they can provide in one charge, how quickly that energy is released, how stable the battery is, how quickly it can be recharged, and how many total times it can be charged and discharged, among other variables.

Lithium-ion batteries also come in various cell, module, and pack sizes, with multiple cells making up a module and multiple modules making a battery pack. Battery packs for applications needing more energy such as an electric vehicle may require hundreds or even thousands of cells packaged together as multiple modules, though there is wide variety in how battery packs are designed in the industry. The term "battery" may be used to describe a cell—a single electrochemical unit—as well as a module or an entire pack.

Despite all these variations, EPA has determined that most lithium-ion batteries on the market today are likely to be hazardous waste when they are disposed of due to the ignitability (D001) and reactivity (D003) characteristics. Fires at end of life are common and mismanagement and damage to batteries make them more likely.[3]

Lithium-ion Battery Recycling

Safe recycling of lithium-ion batteries at end of life conserves the critical minerals and other valuable materials that are used in batteries and is a more sustainable approach than disposal. Lithium-ion battery recycling is frequently a multi-step process.

Although there is no one path that all batteries take at the end of life, consumer electronics, batteries, and battery-containing devices are often initially collected by a retailer who sold the replacement item, by a storefront e-waste collector, or by an IT asset disposition firm. Electric vehicle batteries may end up at a dealership or automobile mechanic shop, if the vehicle's battery needed to be replaced, or at an automobile disassembler, if the entire vehicle reached the end of its life. In all cases, batteries must be identified and sorted for proper recycling and may change hands several times in the process, getting shipped to other collection facilities before arriving at a facility that can process them. Larger battery packs could be partially disassembled at any time in this process into cells or modules to facilitate transportation, storage, and processing.

Some battery packs or modules may also be evaluated for repair or reuse—either being put back into a device of the same design as their first application or being repurposed in a different type of product or application. For example, some companies are experimenting with repurposing used electric vehicle batteries for stationary energy storage. Battery packs that can be repaired may have one or more underperforming modules replaced before being put back into use in the original or other appropriate application.

When a battery is slated for recycling after collection and evaluation, a common next management step is pre-treatment or shredding. Depending on the size of the shredding equipment, part or all of the battery is shredded. In some cases, a portion of a device containing a battery may also be shredded. The

[2] https://www.usgs.gov/news/national-news-release/us-geological-survey-releases-2022-list-critical-minerals
[3] https://www.epa.gov/recycle/importance-sending-consumers-used-lithium-ion-batteries-electronic-recyclers-or-hazardous

batteries are either discharged before this step, are shredded in an inert environment, or are otherwise managed to prevent fires during shredding. Many battery recyclers are also accepting battery materials in the form of manufacturing scrap for processing.

The shredding operation creates a number of different streams, including the following:

- black mass, a filter cake-like material made up of the shredded cathodes and anodes of the batteries;
- copper and aluminum foils onto which anodes and cathodes are coated;
- separators;
- plastics;
- steel canisters; and
- electrolytes.

Black mass contains the materials that can be further processed to be made into new battery cathode and anode powders. Although the term "black mass" is commonly used, as of today, there are not industry specifications for black mass and, depending on the inputs and the shredding process employed, there can be wide variation from site to site in the exact make-up and amount of liquid in this material. Black mass is frequently then sent to another facility for metals recovery and may be exported for this purpose. Other output materials, such as foils and steel canisters, may also be recycled through separate, dedicated pathways.

Although innovations are happening quickly in lithium-ion battery recycling, currently there are two main methods to recover the metals out of black mass: pyrometallurgical recycling and hydrometallurgical recycling. The ReCell Center at Argonne National Lab defines pyrometallurgy as a "process or technique of refining ores (or recovered material) using heat to melt the metallic and burn the non-metallic content" and hydrometallurgy as a "process or technique of extracting material at ordinary temperatures by leaching ores (or recovered material) with liquid solvents."[4] In some cases, pyrometallurgy can also be used to recover metals from batteries without an initial shredding step. Generally, pyrometallurgical recycling can recover cobalt and nickel, but it would take additional steps to recover other critical materials like lithium from the slag. Leading developers of hydrometallurgical recycling technologies tout its ability to economically recover high amounts of cobalt, nickel, lithium, and manganese at the pilot scale. Hydrometallurgical recyclers are working to commercialize their recycling technology more broadly.

After metals recovery, to complete the recycling process, the recycled materials can then be made into precursor cathode active materials ("pCAM") and, finally, cathode active materials ("CAM"), which can go into manufacturing new lithium-ion batteries.

In addition to the two main recycling techniques, some researchers and recyclers are experimenting at the pilot scale with a technique called direct recycling in an effort to bring it to market. Direct recycling, sometimes called cathode to cathode recycling, saves energy by preserving the highly engineered cathode structure that is the most valuable part of the lithium-ion battery and reducing the amount of manufacturing needed to return the materials to pCAM or CAM grade.

Commercial-scale metals recovery recycling plants in the US are still in development at the time of this memorandum, but multiple facilities are expected to be opening in the next few years, rapidly expanding

[4] https://recellcenter.org/lithium-ion-battery-and-recycling-terminology/

domestic opportunities for recycling of lithium-ion batteries at end of life. EPA's dissemination of information about safe and compliant recycling of end-of-life batteries to the states, industry stakeholders, and the public will support this piece of the circular economy. To further EPA's dissemination of this information, the attached frequently asked questions address the common inquiries raised about the RCRA regulations related to hazardous waste determinations, universal waste, and recycling as they pertain to these batteries. Because of the rapid growth in this market, the recommendations in EPA's guide on Choosing a Responsible Recycler may also be helpful to generators of this waste stream.[5]

If you have any questions, please contact me or Kathy Lett at 202-566-0517 or lett.kathy@epa.gov.

[5] https://www.epa.gov/hwgenerators/choosing-responsible-recycler-guide-generators-secondary-hazardous-materials

Frequently Asked Questions on Lithium-Ion Battery Recycling

(1) Are lithium batteries hazardous waste?

When they are disposed, most lithium-ion (secondary batteries) and lithium primary batteries in use today are likely to be hazardous waste due to ignitability and reactivity (D001 and D003). With the exception of households, generators of lithium battery hazardous waste are responsible for determining whether the spent lithium batteries they generate are hazardous waste and, if they are, the generators need to manage the batteries accordingly under hazardous waste requirements. (See Question #5 for information on safe household battery management.)

There are a wide variety of lithium battery chemistries used in different applications, and this variability may impact whether a given battery exhibits a hazardous characteristic. Lithium batteries with different chemical compositions can appear nearly identical yet have different properties (e.g., energy density). In addition, other aspects of a battery's design beyond simply the chemistry can also impact its likelihood to be ignitable and/or reactive and pose a hazard during end-of-life management. Some discarded lithium batteries are more likely to have hazardous characteristics if they contain a significant charge, yet such batteries can appear to the user to be completely discharged.

In addition, the design of advanced batteries used in electronics, energy storage, and electric vehicles will continue to evolve and may result in new chemistries that become common in use and that will have to be evaluated for potential hazards at end of life.

For these reasons, it can be difficult for a generator to identify which of its used lithium batteries are hazardous waste when disposed. Therefore, EPA recommends that all lithium batteries be managed with care during use and at end of life and that businesses consider managing all of their used lithium batteries as hazardous waste under the federal "universal waste" regulations in Title 40 of the Code of Federal Regulations (CFR) part 273.

(2) Does universal waste cover batteries with lithium chemistries?

Yes. Both rechargeable lithium-ion and single use lithium primary batteries can be managed as universal waste. The universal waste definitions describe batteries as devices consisting of one or more electrically connected electrochemical cells which are designed to receive, store, and deliver electric energy (40 CFR 273.9). While the universal waste battery regulations were developed before lithium-ion and lithium primary batteries were a common technology, the definition of a battery in these regulations broadly captures batteries that would be hazardous waste.

(3) What are the universal waste requirements for lithium batteries?

The universal waste regulations provide a streamlined set of requirements under RCRA for generators and other handlers of specific types of common hazardous wastes from a wide variety of commercial settings (e.g., batteries, recalled pesticides, mercury-containing equipment, aerosol cans). Requirements differ depending on whether the handler accumulates more or less than 5,000 kilograms of total universal wastes on site at one time, but include how to manage the waste, how to label containers, how long the waste can be accumulated on site, where the waste can be sent, and other aspects of end-of-life battery management. Universal waste regulations do not require shipment using a hazardous waste manifest but do require that the waste be sent to a permitted

hazardous waste disposal facility or a hazardous waste recycler as the final destination. International shipments of lithium batteries managed as universal waste must also comply with RCRA requirements for export and import of universal waste. EPA's universal waste battery regulations do not mandate use of a uniform hazardous waste manifest or shipment using a hazardous waste transporter, but Department of Transportation regulations for shipping lithium batteries do apply. EPA recommends that businesses consult their state solid and hazardous waste agencies for additional information on applicable universal waste regulations. Given the number of fires from lithium batteries, EPA is evaluating the universal waste battery management standards.

(4) What are the federal regulations for generators of very small amounts of hazardous waste batteries?

A non-household that generates fewer than 100 kilograms (about 220 pounds) of lithium batteries and all other hazardous waste in a month is a "very small quantity generator" (VSQG) under the federal RCRA regulations and is subject to reduced hazardous waste management requirements that include a limit on how much hazardous waste can be accumulated at any one time and certain requirements regarding where the waste can be sent for disposal. Check with your state regulatory program, as some states are more stringent and may have different requirements.

(5) How does the household hazardous waste exemption apply to batteries?

Under RCRA, household hazardous waste—waste generated by normal household activities such as routine house and yard maintenance—is excluded from the definition of hazardous waste and is not regulated by federal hazardous waste rules as long as it is not mixed with non-household waste. Wastes covered by the household hazardous waste exclusion must satisfy two criteria:

(i) The waste must be generated by individuals on the premise of a temporary or permanent residence, and
(ii) The waste stream must be composed primarily of materials found in wastes generated by consumers in their homes.

EPA interprets this exclusion to include waste generated in household-like areas, such as bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas.

However, EPA always recommends that household hazardous waste be segregated from the municipal waste stream to avoid introducing hazards to workers and communities. Specifically, lithium batteries pose a fire hazard to waste management workers and collection facilities when disposed of in the municipal waste stream. EPA recommends that households who generate used lithium batteries treat them with care, isolate the terminals (e.g., cover the terminals with non-metallic tape while keeping the label legible, or individually bag batteries), and protect the batteries from damage. Do not place the waste lithium batteries in the household trash or in curbside recycling bins. Instead, EPA recommends that all household lithium batteries be dropped off at battery collection sites (e.g., often located at electronics retailers) or household hazardous waste collection facilities for proper management. The EPA Used Lithium-Ion Batteries web page offers resources to find a battery recycling location near you.
Household hazardous waste is regulated on the state and local level and state regulatory requirements for batteries may be more stringent than those in the federal program. Be sure to check your state's battery waste policies.

(6) Are electric vehicle batteries considered household hazardous waste?

Electric vehicle batteries removed at a dealership, an auto shop, a scrap yard, or similar type of facility are not household hazardous waste.

(7) Can a damaged, defective, or recalled (DDR) battery be managed under universal waste?

A handler of universal waste may only manage broken or damaged hazardous waste batteries as universal wastes if the breakage or damage does not constitute a breach in an individual cell casing. The definition of battery in 40 CFR 273.9 does not explicitly state that all batteries must be whole; however, the definition includes an intact, unbroken battery from which the electrolyte has been removed (60 FR 25492, 25504; May 11, 1995). Additionally, the requirements for handlers of universal waste allow certain management activities, such as sorting and mixing batteries, provided the batteries or cell casings are not breached and remain intact (sections 273.13(a)(2) and 273.33(a)(2)). The disassembly of a battery pack into individual modules or cells with no damage done to the cell casing does not make a battery damaged or defective.

Damaged, defective, or recalled (DDR) batteries may not be transported by air. In addition, they must comply with specific Department of Transportation (DOT) packaging requirements found at 49 CFR 173.185(f).

(8) What are some additional best management practices for safely storing collected end-of-life lithium batteries?

EPA recommends that beyond following the universal waste standards for storage and DOT's transportation standards for lithium batteries, handlers of end-of-life lithium batteries take additional precautions to protect against the chance of thermal runaway and fire. These include—

- safety training for all employees removing, disassembling, or handling the batteries;
- isolating the terminals of the batteries with non-conductive tape, plastic bags, or other separation techniques, keeping the label legible;
- preventing damage to batteries;
- storing batteries in climate-controlled spaces with good ventilation;
- storing batteries in a separate building away from other flammable materials and occupied spaces when possible;
- storing batteries that have been identified as damaged, defective, or recalled (DDR) separately from non-DDR batteries in appropriate containers;
- installing advanced fire detection and suppression equipment;
- conducting frequent visual and thermal inspections of batteries;
- having ongoing communications with local fire marshals and first responders about materials and processes happening on site; and
- maintaining a plan for how to respond and evacuate in case of an emergency.

The Bipartisan Infrastructure Law of 2021 directed EPA to develop best practices for the collection of batteries for recycling. Check our website for updates on that initiative.

(9) What waste management activities are allowed under universal waste for handlers of batteries?

Universal waste handlers can conduct certain activities when managing all chemistries of batteries. These activities are sorting batteries by type, mixing batteries in one container, discharging batteries to remove the electric charge, regenerating used batteries, removing batteries from products, and removing electrolyte from batteries.

Due to the high energy density of lithium batteries, handlers may choose to discharge them before shipping them for recycling. EPA recommends that handlers ensure that any discharge is done with all appropriate safety measures in place to prevent fires and protect the health of workers and communities. Lithium batteries may remain hazardous waste after being discharged because they contain ignitable solvents.

The universal waste regulations allow handlers to remove electrolyte from batteries as long as the battery cell is closed immediately after electrolyte is removed, but this is not a likely management scenario for lithium batteries. With the exception of removing electrolyte in this way, universal waste handlers may not breach or open cells).

See section 273.13 for small quantity handlers of universal waste or section 273.33 for large quantity handlers of universal waste.

(10) What is black mass?

Black mass is the term the battery recycling industry uses to describe the filter cake-like material made up of the anode and cathode materials when lithium batteries are shredded. The constituents and properties of black mass will depend on the inputs to the shredding process as well as the specifics of the shredding process itself. Black mass is not a universal waste and is no longer a battery.

(11) Can universal waste handlers process universal waste batteries by shredding them to make black mass?

No. Shredding batteries is not an allowable waste management activity for universal waste handlers under part 273 regulations. Batteries can be shredded for recycling at a destination facility, either a hazardous waste recycler with no storage before recycling or a RCRA-permitted treatment, storage, and disposal facility.

(12) When do the universal waste standards no longer apply to a battery being processed at end of life?

Once a battery has arrived at the destination facility (i.e., a permitted treatment, storage, or disposal facility or a hazardous waste recycler) for recycling or disposal, it is no longer a universal waste, but a fully regulated hazardous waste. Likewise, after pretreatment for recycling (often shredding), the separated components of the battery are no longer universal waste.

(13) Does a battery recycler have to get a RCRA Part B permit for hazardous waste treatment, storage, or disposal?

Removal of hazardous waste batteries from devices, sorting, battery discharge, and disassembly of batteries into cells or modules prior to recycling would not require a RCRA hazardous waste treatment permit when performed in preparation for recycling because these activities would be considered part of an exempt recycling process per 261.6(c)(1). Likewise, shredding of batteries to produce black mass and separate foils and other materials for recycling are also part of an exempt recycling process. However, these activities should always be performed with caution and while using all appropriate best practices for safety and fire prevention. States may have battery management requirements or recycling permitting requirements that are more stringent than the federal RCRA regulations.

A battery recycler that stores hazardous waste (e.g., ignitable/reactive batteries and/or black mass that exhibits one or more characteristics of hazardous waste) before recycling must obtain a RCRA Part B permit. Federal regulations do not specify an allowable "holding time" prior to the waste being introduced to the recycling process; however, the appropriate EPA Regional office or authorized State regulatory agency may specify such a holding time on a site-specific basis, defining a time at which storage begins.

In addition, the recycling units at these facilities otherwise subject to RCRA permitting must comply with the air emission standards in part 264/265 subparts AA and BB (per section 261.6(d)), if applicable. Aside from the air emission requirements, the recycling process itself is exempt from Subtitle C requirements (section 261.6(c)(1)).

The RCRA hazardous waste requirements for owners and operators of facilities that recycle materials without prior storage are outlined in 261.6(c)(2). Owners and operators of these facilities must obtain an EPA ID number and follow guidelines for the use of the manifest and the reporting of manifest discrepancies (section 261.6(c)(2)(i)–(ii)).

Note that universal waste handlers are prohibited from recycling their universal wastes because recycling is not allowable treatment by universal waste handlers. Thus, a battery recycler that is producing black mass from batteries cannot be a universal waste handler and must be a destination facility.

(14) Is a lithium battery a solid waste when it is reused, repurposed, or repaired or when it is sent for evaluation for reuse, repurposing, or repair?

A battery that is removed from one device or application and is legitimately reused in another similar device or repurposed into another application is not a solid waste under the use/reuse exemption in section 261.2(e)(1)(ii). In addition, as EPA has stated for electronics in general and for cathode ray tubes specifically, repairing electronics before resale is not considered reclamation, and such repair and replacement activities do not constitute waste management (RCRA Online Document #14668 and 71 FR 42929–30; July 28, 2006). Therefore, electronics from a business are not considered solid wastes when sent to resellers for reuse, repurposing, and/or repair and would not be subject to RCRA requirements.

A battery being evaluated for use or reuse becomes a solid waste when a handler determines that it cannot continue to be used or reused and makes the decision to discard it. This determination can be

done off site, but there has to be a reasonable expectation of reuse. From the point the decision is made to discard the battery, it must be managed under the universal waste requirements in part 273 or the hazardous waste requirements in parts 262 through 268.

Legitimate use or reuse of batteries must comply with the legitimate recycling factors in section 260.43. Factors 1 through 3 must be met and a recycler must consider factor 4 in ensuring the use/reuse is legitimate. In the context of lithium batteries, these factors would be as follows:

(i) The battery provides a useful contribution to a product—when removed from service, it still has the potential to continue to operate effectively and safely as a battery in a device or piece of equipment that requires a battery.
(ii) The reused battery is a valuable product—the product can be sold to a third party or used by the recycler as an effective substitute for a battery they would otherwise purchase.
(iii) The battery is managed as a valuable commodity—between removal from service and reuse, it is managed with appropriate safety and tracking procedures similar to newly manufactured inventories of batteries.
(iv) The reused battery does not contain hazardous constituents or exhibit hazardous characteristics that an analogous product does not—a battery that is damaged or otherwise not safe could be more likely to be reactive and go into thermal runaway than a healthy battery and should not be reused or sold for reuse.

(15) Do smelters that process batteries qualify for the smelting, melting, refining exclusion from the RCRA boilers and industrial furnaces requirements in 40 CFR part 266 subpart H?

Certain furnaces that process hazardous waste lithium batteries or hazardous waste black mass *solely* for the purpose of recovering metal(s) may qualify for this exemption, providing they meet all of the requirements for the exemption. Treatment of non-metals, or of metals that will not be recovered via smelting, in these units could constitute a violation of RCRA. States may also have their own regulations for the containment building in which the smelting occurs.

(16) Is black mass a hazardous and/or solid waste when sent or received for further reclamation?

As described above, black mass is the term industry uses to describe the filter cake-like material made up of the anode and cathode materials when lithium batteries are shredded. The constituents and properties of black mass will depend on the inputs to the shredding process as well as the specifics of the shredding process itself. Black mass is not a universal waste and is no longer a battery. A hazardous waste remains a hazardous waste until, per 40 CFR 261.3(d), it doesn't exhibit any hazardous waste characteristic, and, if it has been listed, it undergoes a delisting (40 CFR 261.3(c)).

Black mass could exhibit one or more characteristics of hazardous waste, but it is not derived from a listed waste. Therefore, it is not a hazardous waste once it no longer exhibits a characteristic. Until the recycling process is complete, it would remain a solid waste that may be regulated under state and local solid waste requirements.

If black mass does not exhibit a characteristic of hazardous waste, it would not be a hazardous waste. Though the most common metals used in lithium batteries do not appear on the list of contaminants that can make a waste exhibit the toxicity characteristic found in 40 CFR 261.24, contamination from other chemistries of batteries could result in black mass exhibiting the toxicity characteristic for

a hazardous constituent such as cadmium. EPA recommends careful sorting of battery chemistries to avoid contamination. In addition, the composition of the electrolytes, binders, and other additives to batteries can vary significantly by manufacturer and between generations of batteries. Under the RCRA regulations, it is the generator's responsibility to make an accurate hazardous waste determination of any waste stream and manage the waste accordingly.

In addition, note that wastes that exhibit a characteristic at the point of generation may still be subject to the RCRA land disposal restrictions of part 268, even if they no longer exhibit a characteristic at the point of land disposal (40 CFR 261.3(d)(1)). Therefore, if the black mass is being disposed of instead of recycled, or if it is managed on the land prior to recycling, then the land disposal restrictions would apply.

(17) Can you recycle lithium batteries using the definition of solid waste transfer-based exclusion at 40 CFR 261.4(a)(24) and (25)[6]?

Yes, lithium batteries can be recycled under the definition of solid waste recycling exclusion at 40 CFR 261.4(a)(24) and/or 40 CFR 261.4(a)(25) (for recycling occurring domestically and after export, respectively) as long as (1) both the state that the batteries are generated in and the state in which the recycling takes place have adopted this exclusion and (2) all of the conditions of the exclusion (40 CFR 261.4(a)(24) and/or 40 CFR 261.4(a)(25)) are being met by all applicable parties. Note that these requirements have implications for both the recycler (e.g., financial assurance or a RCRA storage permit) and the generators of the batteries (e.g., generators must conduct a "reasonable efforts" audit on the recycler if the recycler does not have a RCRA permit).

In addition, if a shipment of hazardous secondary material is being transported through a state that has not adopted the exclusion, that transit state's hazardous waste regulations could apply once the shipment reaches the border of that state. We encourage companies to contact all states through which interstate transport of your hazardous secondary materials may occur to ensure compliance with each state's regulations.

(18) When are materials from lithium batteries that are being recycled sufficiently processed to no longer be considered waste?

Materials derived from recycling lithium batteries, such as black mass and other intermediates, are no longer wastes when they do not need to be reclaimed further before being used as an ingredient in a process to make a new product. That is, for example in lithium battery recycling, reclaimed metals that are suitable for direct use, or that only have to be refined to be usable are now products and no longer considered wastes.

(19) Can lithium batteries be managed under the scrap metal exclusion?

Batteries are specifically not included in the scrap metal exclusion (50 FR 624), so this exclusion is not applicable to the management of end-of-life lithium batteries.

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[6] The definition of solid waste exclusion found at 40 CFR 261.4(a)(24) is either called the transfer-based exclusion or the verified recycler exclusion depending on whether states adopted the 2018 or 2015 version of the Definition of Solid Waste Rule, respectively. For more information on implementation of this exclusion, see the Definition of Solid Waste implementation guide. For a map of which states have adopted the Definition of Solid Waste Rule, see the Definition of Solid Waste Rule webpage.