

# Reed College Battery Recycling Standard Operating Procedure

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## 1.0 Purpose and Scope

Not all batteries are made of the same materials, which is important to consider when recycling or disposing of them. Rechargeable batteries create less waste and conserve resources yet contain heavy metals like cadmium, lead and nickel, which may contaminate the environment if not disposed of properly. Rechargeable batteries like lead acid batteries are highly recyclable though they contain strong sulfuric acid, which is dangerous when leaked into the environment. Non-rechargeable batteries also contain chemicals such as potassium hydroxide, a caustic agent that can cause respiratory, eye, and skin irritation as well as heavy metals like zinc and manganese. The intention of this document is to provide standard operating procedures for Reed College employees to properly handle the different types of used batteries for recycling/disposal.

The battery recycling program at Reed College applies to all employees who use and/or replace any type battery, including custodial and maintenance staff as well as to those who process the used batteries. Employees will have access to a copy of this written policy.

## 2.0 Battery Recycling Procedure

### 2.1 Battery Drop-Off Locations

Send used batteries for disposal by bringing them to the following locations:

- The Recycling Center, located on the ground floor of the GCC near the mailroom. Please sort your batteries into the appropriately labeled bin.
- Chemistry 211
- Physical Plant, EHS offices

If any of the batteries are leaking, place them in a plastic bag away from the clean batteries. **Please notify EHS of any ruptured or damaged lithium batteries as they may violently react when exposed to moisture in the air and are extremely hazardous.**

### 2.2 Battery Sorting

EHS, Sustainability at Reed, or other trained partner groups will sort, prepare, and package the batteries to be sent to the processing facility.

### Precautions

Improper storage and handling of universal waste batteries can pose special health and safety risks. Steps should be taken during the handling and storing of batteries to minimize the risks. There is a potential for partially corroded batteries to leak caustic chemicals. If proper precautions are not taken, workers handling batteries may get chemical burns on their skin.



Workers handling batteries should protect themselves by wearing protective clothing, including rubber gloves, eye protection, and rubberized aprons. Additionally, some types of batteries are incompatible with each other and have the potential to create exothermic reactions in the event of a leak. Electrical fires are also a potential hazard if contact is created between Cathode (+) and Anode (-) terminals. Be aware that other items than batteries may be found in disposal buckets and could present hazards of their own (i.e. pushpins and other sharps). Do not blindly reach into the buckets when sorting batteries, but instead lay batteries on a flat surface and inspect for poking hazards.

## Sorting Procedure

Batteries should be separated by type prior to shipping and ideally as soon as possible. The following general sorting procedure should be followed to ensure safe handling and reduce the likelihood of accidental electrical and chemical release.

- Pour a portion of batteries onto a flat surface and inspect for potential poking hazards.
- Sort batteries according to type described on the casing ([See Appendix 1](#)).
- Tape the terminal ends of batteries to prevent the accidental contact of anodes and cathodes.
  - Alkaline batteries less than 9 volts do not need to be taped.
- Place the sorted and taped batteries into separate buckets by type. Ensure the lid is closed.
- Label each bucket stating the type of battery and the start date of collection. Batteries must be disposed of within one calendar year of the collection start date.

## 3.0 Battery Packaging and Shipping

Reed College utilizes Call2Recycle and Total Reclaim to transport our waste batteries for disposal. Specific packaging procedures for each vendor is detailed below.

### 3.1 Call2Recycle Instructions

These instructions can also be found on Waste Room 211 Poster and in Battery Recycling binder:

1. **Assemble a new Call2Recycle (C2R) box** if there is not an existing one. If there is an existing box check its current weight; if it is 49 lbs. or more - start a new one. If the box is less than 50 lbs., add batteries to it.
2. **If it is a new box, write the start date** on the back of the C2R box in the provided start date area and fill in the return shipping address. If it is an existing box, check to make sure the start date is less than a year.
3. **Bag individual batteries** using a provided bag (has a white strip on top). For big batteries or if no bag is available, tape the battery terminals with electrical, duct or masking tape.



4. **Leaking batteries:** place in plastic bag before putting in shipping box.
5. **When box is ready to ship:**
  - Take out batteries and make sure each one is TAPED or BAGGED.
  - WEIGH batteries to make sure they are not heavier than 11 lbs./5kg each. The scale in the waste room measures in kilograms.
  - Log in Waste Generation sheet, include:
    - Type of batteries and where shipped (Alkaline, NiCd, Li-Ion)
    - RCRA code, Resource Conservation and Recovery Act
    - DOT code, Department of Transportation (9 PG II/8 PG III)
    - Weight (lbs)
6. **Secure box** by cross taping both vertically & horizontally. Print return address on the pre-paid address-shipping label if not already done. Take to the mail room on cart & ship.

**Call2Recycle service is free including shipping.** Once your shipment has been received at their recycling facility, Call2Recycle's automated program will determine when more boxes should be sent to our location (allow up to three weeks for your replenishment boxes to arrive).

Before ordering additional boxes, please check location for boxes that have not been shipped, are not filled, or remain unused.

If you need to order more boxes or have any program questions refer to **Site ID 134710**.

Contact Call2Recycle's Customer Service Department by calling toll free 1-877-273-2953 or emailing: [customerservice@call2recycle.org](mailto:customerservice@call2recycle.org).

If there is an excess of pre-sealed plastic bags it is okay to send them back with shipment of used batteries.

## 3.2 Total Reclaim Instructions

Recycling Instructions (PowerPoint of this in battery folder on Google Drive):

1. Sort batteries by THREE types: Each type packaged separately & labeled as to type.
  - a. **Mixed Batteries:** (DRY CELL ONLY) Acceptable Battery Types are Nickel Cadmium, Nickel Metal Hydride, Nickel Iron, Silver Zinc. Insulation of battery terminals NOT required on 9 volt & under batteries.
  - b. **Alkaline Batteries:** Cylindrical (AA, AAA, C, D) type batteries. Insulation of battery terminals NOT required on 9 volt & under batteries.
  - c. **Button Cell Batteries:** All types, "CR" Lithium Manganese dioxide, "BR" Lithium / Carbon monofluoride. Lithium must be by its self on tape and no other type on tape. "SR" Silver oxide, "LR" Alkaline can be on same tape. Insulate ALL battery terminals on Button cell batteries. When placing batteries on tape, make sure no part of battery cell touches other sides of battery cells on tape. Keep cells all facing same way on tape. A table of button cell battery types can be found in Appendix 2.



2. Make sure each new bucket that is started includes a sticker that reads **“Used Batteries,” “Universal Waste” or “Waste Batteries”** and includes the **date that the first battery is placed into the bucket.**
  - a. Labels can be found under the counter in Rm. 211 and in the Battery Recycling binder. New labels can be printed from the server where they are located under the “Batteries” folder.
  - b. The batteries in the container must be recycled within one year from that date.
3. Place leaking batteries in a plastic bag and or separate bucket until stable, and then add to the appropriate container in a new bag.
4. Insulate battery terminals according to Total Reclaim Battery Recycling guidelines. *Note that not all batteries need to be insulated.* See Total Reclaim guidelines for types of batteries that need insulation (located in Waste Room Battery Recycling binder). To insulate battery terminals use **one** of the following methods:
  - a. Tape all terminals with sturdy non-conductive tape (not masking or metallic).  
**\*\*Any battery over 9 volts must have terminals taped.\*\***
  - OR**
  - b. Place each individual battery in a sealed plastic bag or plastic bag that has been sealed with tape.
5. **Weigh bucket** and log in Waste Generation sheet when the bucket is ready to be shipped to Total Reclaim. Include:
  - Type of batteries
  - Where shipped
  - RCRA code, Resource Conservation and Recovery Act
  - DOT code, Department of Transportation
  - Weight

**Do not put more than 50 lbs in each bucket to be shipped to Total Reclaim.** Indicate the number of pounds on the container lid.
6. Secure lid with tape to bucket so there is no confusion if batteries have or have not been processed.
7. Place label **“Do not add batteries; Ready for Total Reclaim Pick-up”** on bucket lid when ready for pickup.
8. Transport the buckets of batteries for Total Reclaim to the warehouse on a cart.
  - a. Place Batteries with fluorescent lamps to be shipped out. Batteries should be shipped when Total Reclaim comes to get fluorescent lamps. If not possible, call them for pick-up at 503-281-1899.
  - b. Check with the Facilities secretary when there are a sufficient number of full buckets. She will call to arrange a time to meet the recycler for pickup.
  - c. Obtain the Bill of Lading from the driver when the batteries are collected for recycling.
  - d. Send the shipping papers to the EHS Department.



## 4.0 Unknowns

Not everything that comes in for disposal is cut and dry, and sometimes it is not even a battery. It is not unusual for old capacitors and transformers to be put in the mix as well. When coming across a battery, or any other unknown object, set it aside in a container for future investigation. Many foreign batteries do not have descriptive labels or advertise if they are alkaline or rechargeable. For capacitors and transformers, look up their company, # and type before disposal, as some old capacitors may contain PCBs which are harmful to the environment and should be disposed of properly. PCBs have been banned in new transformers and capacitors since 1981, so assume anything older contains PCBs. If you are not sure, assume they are present anyway; a good way to tell is the capacitor's/transformer's weight, since PCBs are heavy. Appendix 3 has a table of some objects you may come across.

## 5.0 Damaged Batteries

Damaged or leaking batteries pose a hazard to both individuals and the environment through the release of corrosive chemicals and potential for combustion. Damaged batteries should be identified, packaged in leak-proof plastic bags, and stored away from other batteries while awaiting disposal.

### 5.1 Lithium Batteries

Damaged lithium batteries such as cell phone and laptop batteries pose a great risk due to their reactivity with moisture in the air, making them a likely combustion source. Metal fires burn at extremely high heat and require smothering as an extinguishing mechanism, either through sand or by using a Class D fire extinguisher.

Due to their high hazard, specific protocols should be followed when storing damaged lithium batteries. There are metal pails at three locations (Computer User Service, Chemistry 211, and the Warehouse building) dedicated to the storage of damaged lithium batteries. The following procedure should be followed when adding batteries to the pails:

1. Place each individual battery in its own plastic bag
2. Place bag in metal pail
3. Cover with layer of vermiculite or sand
4. Close lid
5. Notify EHS ([ehs@reed.edu](mailto:ehs@reed.edu)) when pail is full

### 5.2 Lead Acid Batteries

Lead acid batteries use sulfuric acid or other strong acids as an electrolyte. Damaged batteries can leak the acid and cause skin burns or corrosion to the storage container if they are not properly packaged.



Battery spill kits are available in Chemistry 211 and with the IT department. To clean a spill of battery acid, wear proper personal protection equipment including gloves and safety goggles. Neutralize any free liquid with baking soda, then sweep the material and any contaminated spill pads or paper towels into a trash bag. Label the bag with a hazardous waste label. Place damaged lead acid batteries into a plastic bag and note on a universal waste label that the battery is damaged. Bring both the spill debris and the damaged battery to Chemistry 211 for disposal.

### 5.3 Dry Cell Batteries

Dry cell batteries such as alkaline and zinc chloride batteries may rupture and release caustic powder if exposed to water or other fluids. These batteries are less hazardous than lithium and lead acid batteries, but should still be handled with caution. Damaged batteries can be stored with non-damaged batteries of the same type. Clean any powder or other material released from the batteries with a broom and dustpan and dispose in the trash.

## 6.0 References

Used batteries are treated as Universal Waste under federal EPA and Oregon-DEQ regulations. According to OR-DEQ, management of universal waste batteries must be managed “in a way that prevents the release of any waste or component of the waste to the environment” (OR-DEQ Fact Sheet: “Management of Waste Batteries under the Universal Waste Rule”).

As a Universal Waste Handler, Reed College must clearly indicate the length of time that the universal waste has accumulated through clear labeling and marking (see Procedures). Regulations require that Reed College recycles all used batteries within a year of the accumulation date and sorts them by battery type.

### Relevant Regulations

- Environmental Protection Agency (EPA). Title 40 Code of Federal Regulations (CFR) Subpart A and B, 273, Universal Waste Management Systems.
- Oregon Department of Environmental Quality (OR-DEQ). Oregon Administrative Rule (OAR) 340-113. Universal Waste Management. 2007.
- Department of Transportation (DOT). Hazardous Materials Regulations; 49 CFR Parts 171.24. 2007.



## Appendix 1: Where to Send Recycled Batteries

Battery Type	Where to Recycle?	
	Call2Recycle – Free	Total Reclaim – Fee based on weight
Alkaline (non rechargeable) – Alkaline ONLY, AA, AAA, C, D, 9-volt, Lantern *Includes Titanium	No	Yes
Button cells	No	Yes
Carbon Zinc (Zinc Carbonaire)	No	Yes
Lithium Ion (Li-Ion) (rechargeable) Lithium Ion Polymer	Yes	No
Lithium primary (non rechargeable) – Lithium Sulfur Dioxide Lithium Manganese Dioxide Lithium Thionyl Chloride *weighing less than 2lbs.	No	Yes
Mercury (mercuric oxide, mercury cell)	No	Yes
Nickel Cadmium (Ni-Cd) (rechargeable)	Yes	No
Nickel Metal Hydride (Ni-MH)	Yes	No
Nickel Oxyhydroxide (NiOx)	No	Yes – put w/ Mixed Batteries
Nickel Zinc (Ni-Zn) (rechargeable)	Yes	No
Rechargeable Alkaline Manganese	No	Yes
Silver oxide	No	Yes
Small Sealed Lead Acid (SSLA/Pb), weighing less than 11 pounds (5kg) each	Yes	No
Lead acid batteries more than 11 lb.	No	Yes – Free of charge
Wet or Gel Cell	No	Yes – Call for Quote
Zinc Air (Zinc)	No	Yes
Cell Phones	Yes	No



## Appendix 2: Button Cell Battery Types

<b>Alkaline</b>	<b>Carbon Zn</b>	<b>Lithium</b>	<b>Silver Oxide</b>	<b>Zinc</b>	<b>NiCd</b>
A76 (Energizer)	491, 240v (Energizer)	CR2032 (Energizer, Panasonic)	390 (Energizer)	V400 PX (Varta)	
LR44 (Maxell, Toshiba)	S006PN	CR1620	386 (Energizer)		
LR41 (NC) AG3 (Sanik)		2016	357/303		
LR 43					
10GA (Varta)		ML1220 (Varta)	S 400PX		
N (Sunrise)		CR1632	V76PX (Varta)		
L1154		RFA-67			
G13A					
GPA 76					
AG13					



### Appendix 3: Unknown Batteries/Items

Unknown Item	Batteries		Capacitor	Transformer	PCBs Present?
	Lithium	Alkaline			
Power Pack #14885	Yes	No	N/A	N/A	N/A
Aerovox	N/A	N/A	Yes	No	No
Sprague	N/A	N/A	N/A	N/A	Yes
D16516	N/A	N/A	Yes	No	No
Amseco	N/A	N/A	N/A	N/A	Yes
XP1640	N/A	N/A	No	Yes	No
FTC, cs420	N/A	N/A	Yes	No	No
Sangamo	N/A	N/A	Yes	No	Yes
Juicebar	Yes	No	N/A	N/A	N/A
JustMobile Gum (all forms)	Yes	No	N/A	N/A	N/A

