



The safe use and disposal of batteries

WHAT IS A BATTERY?

A battery is a portable power source, converting chemical energy into electricity.¹ Within the last few decades there has been a dramatic growth in the number and diversity of electrical and electronic products that use batteries. Most homes will contain many pieces of equipment that depend on batteries to operate, for example, alarm clocks, toys, mobile phones, computers, watches, torches, power tools, radios and electric toothbrushes.

As the number of battery-powered products has risen so has the consumption of batteries. For more information on the different types of batteries, please see summary on page 3 or go to www.mfe.govt.nz/issues/waste/special/batteries/index.html

WHY SHOULD WE BE CONCERNED ABOUT BATTERY DISPOSAL?

Although waste batteries are a relatively small amount of the solid waste stream, they are a concentrated source of toxic heavy metals such as mercury, lead and cadmium. The amount of these heavy metals may vary from battery to battery and some batteries are being manufactured without the addition of these heavy metals.²

It is estimated that 120 tonnes of batteries are disposed of annually to landfill in Christchurch alone.³

If batteries containing heavy metals are disposed of incorrectly, the metals can leach out and pollute the soil and groundwater, endangering humans and wildlife. Long-term exposure to cadmium, a known

human carcinogen, can cause liver and lung disease. Mercury can cause damage to the human brain, spinal system, kidneys and liver. Sulphuric acid in lead acid batteries can cause severe skin burns or irritation upon contact. Consumers can help protect themselves and the environment by correctly disposing of all types of batteries.

Batteries contain a range of metals that can be reused as secondary raw materials. Reusing these resources reduces the environmental impact of extracting them as primary raw materials.

HOW SHOULD BATTERIES BE DISPOSED OF SAFELY?

There are well-established methods for recycling most batteries containing lead, nickel cadmium, nickel-metal hydride and mercury. Both non-rechargeable and rechargeable batteries can be recycled and, wherever possible, all should be disposed of safely. However, the infrastructure for recycling smaller batteries is relatively small in New Zealand.

For information on safe disposal and recycling of mobile phone batteries please see the fact sheet on mobile phones www.mfe.govt.nz/issues/waste/special/e-waste/index.html

WHAT ELSE CAN YOU DO?

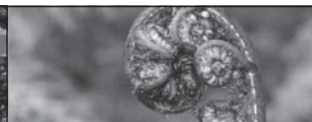
- Plug appliances into the mains power supply as often as you can.
- Use rechargeable batteries and a battery charger rather than non-rechargeable batteries. Not only is this environmentally preferable, it also saves energy because, according to the UK organisation Wastewatch⁴, the energy needed to manufacture

1 Warmer Bulletin. (Jan 2000). *Battery Recycling Information Sheet*. Retrieved 30 May 2006, [www.waste.nl/content/download/471/3776/file/WB70-IS\(batteries\).pdf](http://www.waste.nl/content/download/471/3776/file/WB70-IS(batteries).pdf)

2 Personal communication. Stephen Lardner, (22 May 2006) Energizer

3 Christchurch City Council. (Nov 1998). *Options for Battery Recycling*. Retrieved 25 May 2006, from <http://archived.ccc.govt.nz/council/agendas/1998/November/CityServices/OptionsforBatteryRecyclingRR8703.pdf>

4 Wastewatch (updated July 2005). *Battery Recycling Information Sheet*. Retrieved 25 May 2006, from www.wasteonline.org.uk/resources/InformationSheets/Batteries.pdf



a battery is on average 50 times greater than the energy it provides. This will also save you money in the long run.

However, note that rechargeable batteries are unsuitable for smoke alarms as they tend to self-discharge, preventing the alarm from warning when the battery power is low.⁵ Nearly all other battery-operated equipment can accept rechargeable batteries.

- If you have to use single-use batteries, choose brands with the longest life and, whenever possible, purchase low-mercury or zero-mercury batteries.
- When buying a new product or appliance, choose models that can use power derived from alternative energy sources such as solar-powered calculators or wind-up clocks and radios.
- Participate in local authority battery collection schemes, such as the Hazmobile, or drop off at your local transfer station. If your local council does not currently provide a battery collection scheme, find out if it is planning to do so in the future.
- If you are in a workplace with significant volumes of used batteries, check with the specialist companies listed below for details of any collection and recycling services they may be able to provide.

WHO OFFERS COLLECTION OR RECYCLING SERVICES?

Several local authorities (eg the Auckland Regional Council) provide a battery collection service. The HazMobile service collects hazardous household wastes such as batteries, chemicals and fluorescent lamps. For further information, contact your local authority – details of all local authorities can be found on the following website: www.localgovt.co.nz

Your local authority can also advise you on any local battery collectors and recyclers, such as:

Tredi New Zealand Ltd has a programme to collect, sort and ship nickel cadmium batteries to France for recycling. It also collects and recycles lithium-ion and nickel-metal hydride batteries. Tredi also recycles batteries containing mercury. www.tredi.co.nz

Interwaste is a nationwide hazardous waste processing, disposal and recycling company. It has a collection service for batteries containing nickel, cadmium and mercury. www.interwaste.co.nz

Exide Technologies is a battery manufacturer which offers a recycling service for lead-acid batteries (eg car batteries). It has entered into an arrangement with Dominion Trading Co of Christchurch to collect and safely deliver scrap batteries to the Exide Recycling Centre in Petone. More than 500,000 scrap lead-acid batteries are safely recycled in New Zealand each year. www.exide.co.nz

Sony has a small-scale battery collection point at its stores. It can accept all types of batteries used in Sony products but only in low volumes. www.sony.co.nz/corporate/environment.jsp

Recell offers a service replacing the rechargeable nickelcadmium or nickel-metal hydride batteries in power tools and other portable equipment. New cells are fitted into the old case and the used cells sent to Tredi for environmentally safe disposal. www.recell.co.nz

Millennium Batteries accepts nickel-metal hydride and nickel-cadmium batteries. It provides a drop-off service (ie no collection). **Phone: (09) 410 2402.**

Energizer is one of the world's largest manufacturers of dry-cell batteries. Its website covers product information and the company's environmental efforts. www.energizer.com/learning/environment.asp

Battery World sells a range of batteries and accessories for just about any portable power or starting application. They will take back any old consumer batteries for recycling or environmentally safe disposal at their two retail outlets in Auckland and Whangarei. www.batteryworld.co.nz

If you have comments about this fact sheet please email E-waste@mfe.govt.nz

⁵ Personal communication. Stephen Lardner, (22 May 2006) Energizer

Summary Sheet

Type of battery	Common uses	Hazardous component	Disposal recycling options
Wet Cell			
Lead-acid batteries*	Electrical energy supply for vehicles including cars, trucks, boats, tractors and motorcycles. Small sealed lead-acid batteries are used for emergency lighting and uninterruptible power supplies.	Sulphuric acid and lead	Recycle – most petrol stations and garages accept old car batteries and council waste facilities have collection points for lead-acid batteries
Dry Cell: Non-rechargeable – single use			
Zinc carbon	Torches, clocks, shavers, radios, toys and smoke alarms	Zinc	Not classed as a hazardous waste – okay to dispose of with household waste
Zinc chloride	Similar to above	Zinc	Not classed as a hazardous waste – okay to dispose of with household waste
Alkaline manganese	Personal stereos and radio-cassette players	Manganese (<i>note some older alkaline batteries contain mercury*</i>)	Not classed as a hazardous waste – okay to dispose of with household waste
NB: Dry cell non-rechargeable batteries come in “AA”, “AAA”, “C”, “D”, lantern and miniature watch sizes.			
Primary button cells			
Mercuric oxide*	Hearing aids, pacemakers and cameras	Mercury	Recycle at council transfer station
Zinc air	Hearing aids, pagers and cameras	Zinc	Preference is to recycle at the council transfer station, if facilities are available
Silver oxide	Calculators, watches and cameras	Silver	Preference is to recycle at the council transfer station, if facilities are available
Lithium	Computers, watches and cameras	Lithium (explosive and flammable)	Preference is to recycle at the council transfer station, if facilities are available
Dry cell rechargeable – secondary batteries			
Nickel cadmium* (NiCd)	Mobile phones, cordless power tools, laptop computers, shavers, motorised toys, personal stereos	Cadmium	Recycle at council transfer station
Nickel-metal hydride (NiMH)	Alternative to above. Longer life than NiCd batteries	Nickel	Preference is to recycle at the council transfer station, if facilities are available
Lithium ion (Li-ion)	As above. Greater energy storage capacity than NiCd or NiMH	Lithium	Preference is to recycle at the council transfer station, if facilities are available

¹ For Table Note see over page

¹ Table adapted from New York State Department of Environmental Conservation. *Household Battery Fact Sheet*. Retrieved on 10 March 2006, from www.dec.state.ny.us/website/dshm/redrecy/battery.htm and information from Recycling Batteries. Retrieved on 10 March 2006, from www.enfo.ie/leaflets/as25.htm



Table Note: Batteries that are asterisked* in the table are hazardous on the New Zealand Waste List. They include **lead-acid batteries***, **nickel cadmium batteries*** and **batteries containing mercury***. In cases where wastes are asterisked* as hazardous, the Ministry for the Environment recommends that landfill operators and their respective consenting authority utilise *Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification*, to ensure correct disposal and/or treatment.

TYPES OF BATTERIES²

The basic component of any battery is a cell (or a series of connected cells) in which electrodes react with chemicals to produce electricity.

Alkaline

A primary battery (non-rechargeable) that is often used in electronics applications requiring heavy currents for long periods of time (ie cd players, radios, etc.). Alkaline batteries can deliver 50 to 100 percent more total energy than conventional zinc carbon batteries of the same size, hence their popularity in consumer applications. (Note some older batteries can be called alkaline batteries but contain mercury.)

Zinc Carbon

A primary battery (non-rechargeable) that is commonly used in low-drain consumer applications (ie clocks, calculators, garage door openers, etc.). Available in the same sizes as the alkaline and manganese dioxide ("AA", "AAA", 9-volt, "C" and "D"), zinc carbon are one of the most widely used, dry primary batteries because of their low cost and reliable performance.

² Information from Inform: Strategies for a better environment. Community Waste Prevention Toolkit: *Battery Fact Sheet*. Retrieved on 12 December 2005, from www.informinc.org/fact_CWPbattery.php

Lithium

A primary battery (non-rechargeable) that is quickly entering mainstream electronic designs, particularly in consumer, portable equipment and non-volatile memory back-up applications where small size, long life and low cost are the primary requirements. Lithium batteries have superior cold temperature performance and a shelf life of five to 10 years.

Lithium Ion (Li-ion)

One of the newer rechargeable battery technologies, Li-ion batteries can deliver 40 percent more capacity than comparably sized nickel cadmium batteries and are one of the lightest rechargeable batteries currently available. Li-ion batteries are the batteries of choice in notebook computers, wireless telephones and many camcorder models.

Lead Acid

Still the most popular battery used today, the lead acid battery's main application is in the automobile industry, although it has a growing number of other applications. Its advantages are low cost, high voltage per cell and good capacity life. Its disadvantages are poor low temperature characteristics, that it is relatively heavy, and that it cannot be left in a discharged state for too long without being damaged. Related batteries include Absorbent Glass Matt (AGM), Gel/Gel Cell and Sealed Lead Acid.

Nickel Cadmium (NiCd)

The nickel cadmium is one of the most proven and historically most widely used rechargeable batteries. It is very dependable and "robust" but has relatively low capacity when compared to other rechargeable systems. Very good high rate discharge capabilities make it very popular in high-drain applications such as power tools.



Nickel-Metal Hydride (NiMH)

Interchangeable with most nickel cadmium batteries, nickel-metal hydride batteries generally deliver 10 to 25 percent greater capacity than nickel cadmium batteries and are more environmentally friendly since they do not contain cadmium. They are typically used in many wireless phones and camcorders.

Silver Oxide

A primary battery (non-rechargeable) that is a major contributor to miniature power sources, and well suited for hearing aids, instruments, photoelectric exposure devices and electronic watches. These cells are primarily made in the smaller “button” sizes.

Zinc Air

A primary battery (non-rechargeable) that was commonly used for applications such as watches and hearing aids. In relation to their physical size, zinc air batteries store more energy per unit of weight (in terms of 220 W h/kg) than any other primary type.

GLOSSARY OF TERMS

Primary battery

A battery that is not intended to be recharged and discarded when it has delivered all of its electrical energy.

Rechargeable battery

A galvanic battery that, after discharge, can be restored to the fully charged state by the passage of an electrical current through the cell in the opposite direction to that of discharge.

Recondition

One or more deep discharge cycles below 1.0 volt/cell at a very low, controlled current. Recondition helps to revert large crystals to small, desirable-sized crystals, often restoring the battery to its full capacity.

Secondary battery

A battery that can be recharged and reused many times.

Wet cell

A primary cell that has a liquid electrolyte such as lead-acid batteries.

Dry cell

A primary cell that has a non-liquid electrolyte.

Button cell

A small flat circular battery shaped like a ‘button’ used in small electronic devices such as watches and hearing aids.

