



**Public guidance on the hazardous waste status of zinc carbon, zinc chloride, alkaline, and nickel-metal hydride batteries under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989***

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This document sets out the Department of the Environment and Energy's position on the hazardous waste status of zinc carbon, zinc chloride, alkaline, and nickel-metal hydride batteries under the *Hazardous Waste (Regulation of Exports and Imports Act) 1989* (the Act) and associated Hazardous Waste (Regulation of Exports and Imports) (OECD Decision) Regulations 1996 (the OECD Regulations) and provides guidance on whether a hazardous waste permit is required to export waste zinc carbon, zinc chloride, alkaline, and nickel-metal hydride batteries to another country.

The information given below does not apply to the hazardous waste status of used lead acid batteries (ULABs) under the Act or OECD Regulations. ULABs are controlled under the Basel Convention on the Transboundary Movement of Hazardous Wastes and Their Disposal (the Basel Convention) and a hazardous waste permit is required for the transboundary movement of this waste.

*What is a zinc carbon/zinc chloride battery?*

Zinc-carbon and zinc-chloride batteries are single cell primary (non rechargeable) batteries. The positive pole (anode) consists of a carbon rod encased in manganese dioxide. The battery's case, which is also the negative pole (cathode) is made of zinc. The case contains a paste of ammonium chloride or zinc chloride. The carbon is not consumed during the discharge of the battery.

*What is an alkaline battery?*

Alkaline batteries are non-rechargeable and are also called manganese or primary batteries. The positive pole (anode) of the battery contains zinc, while the negative pole (cathode) contains manganese dioxide. Potassium hydroxide electrolyte, a strong alkali, is contained within the cells of alkaline batteries. The potassium hydroxide electrolyte is not consumed during discharge of the battery.

*What is a nickel-metal hydride battery?*

Nickel-metal hydride batteries are rechargeable and are also called NiMH, Ni-MH and LSD NiMH (for low self-discharge cells). The positive pole (anode) is made of a range of materials, including rare earths such as lanthanum, cerium, didymium, or praseodymium, or titanium, vanadium, and zirconium. The negative pole (cathode) is nickel oxide hydroxide (nickel oxyhydroxide). Nickel-metal hydride cells contain an alkaline electrolyte, usually potassium hydroxide. The potassium hydroxide is not consumed during discharge of the battery.

*Does Australia consider waste zinc-carbon, zinc-chloride, alkaline, or nickel-metal hydride batteries to be hazardous wastes?*

Australia assigns the Basel Convention code B1090 to waste zinc-carbon, zinc-chloride, alkaline, and nickel-metal hydride batteries, so long as the waste batteries have no



hazardous characteristics, such as being flammable, explosive, or toxic. Batteries meeting these criteria are also known as List B batteries for the purposes of the Basel Convention.

Australia does not consider List B batteries to be hazardous waste as long as they are:

- destined for a recovery operation; and are
- packed according to the internationally accepted standard appropriate for the means of transport.

*What are the appropriate standards for packing waste batteries of any kind for transport by air or sea?*

The UN Recommendations on the Transport of Dangerous Goods (Model Regulations) covers the transport of dangerous goods by most modes of transport. These inform the appropriate standards for packing waste batteries. Standards appropriate to air and sea, respectively, are outlined in the:

- International Air Transport Association Dangerous Goods Regulations; and the
- International Maritime Dangerous Goods Code.

We recommend exporters approach their freight forwarder, the Civil Aviation Safety Authority, or the Australian Maritime Safety Authority, as appropriate, for information on battery packaging so as to demonstrate any proposed waste shipments are packed according to the internationally accepted standard.

*I want to export waste List B batteries for recovery operations. What do I need to demonstrate?*

At the time of writing, a number of comparable countries advised the Department that they also considered zinc-carbon, zinc-chloride, alkaline, or nickel-metal hydride batteries to be List B wastes, as long as the wastes were appropriately packed and transported.

It is always the responsibility of the waste exporter to check whether the destination and transit countries require a hazardous waste permit to import or transit the waste batteries and obtain the relevant consents, if required, and to ensure that the facility at which the batteries will undergo recovery operations is appropriately authorised to undertake such operations.

*I want to export a mixture of zinc-carbon, zinc-chloride, alkaline, or nickel-metal hydride batteries for recovery operations. Is it acceptable to export a mixture of batteries without a permit?*

The Department of the Environment and Energy, as Competent Authority for Australia, would consider a mixture of List B waste batteries as being suitable for shipment under Basel waste code B1090, so long as the conditions outlined above are met and the destination and transit countries do not require a permit to import or transit the waste batteries. It is not acceptable to ship a mixture of List A (*i.e.* batteries containing mercury, lead, or cadmium) and List B batteries.



As lithium batteries may explode or spontaneously combust, you must apply for a permit if you wish to export List B batteries mixed with lithium batteries of any chemistry. Please contact the Department for further advice.

*I want to export waste, zinc carbon, zinc-chloride, alkaline, or nickel-metal hydride batteries for final disposal. Is a permit required?*

The *Hazardous Waste (Regulation of Exports and Imports) Act 1989* provides strict controls on the transboundary movement of hazardous wastes for final disposal. Final disposal is any activity which does not lead to resource recovery. Final disposal can include deposit into landfill, incineration, or permanent storage. You must apply for a permit if you wish to transport any waste battery for final disposal.

*What are the risks in handling damaged or leaking batteries?*

Used alkaline batteries may leak potassium hydroxide. Potassium hydroxide is a strong base forming a highly alkaline solution. When wet, potassium hydroxide can be extremely corrosive and attack certain metals, producing flammable and explosive hydrogen gas.

If alkaline batteries are damaged or mishandled, the potassium hydroxide may leak out of the battery cell. Severe chemical burns can result if potassium hydroxide comes into contact with the skin or eyes.

Most alkaline batteries are intended to be discarded after discharge, and manufacturers warn that it is dangerous to recharge them. Attempting to recharge a discharged alkaline battery can cause the production of gas within the battery canister, which can cause the leakage of the potassium hydroxide electrolyte<sup>1</sup>.

If nickel-metal hydride batteries are severely overheated, over-charged, or subjected to trauma, the batteries may release small quantities of hydrogen gas. Nickel-metal hydride batteries are often constructed with vents to release gas or fuses which open in the event of overheating or overcharging.

Battery handlers should take into consideration the risks associated with waste batteries when packing them for transport and recovery.

*What recovery or disposal options are available?*

While used zinc carbon, zinc chloride and alkaline batteries have recyclable components, these are of relatively low value and few facilities recover metals from them. Used Ni-MH batteries have higher value recyclable components.

Only a small minority of the 10 billion individual alkaline batteries produced annually can be recharged and must be discarded after use. According to Australian Battery Recycling Initiative (ABRI), less than five per cent of all domestic batteries (by count) are being recycled with the majority being disposed of in landfill,<sup>2</sup> being stockpiled, or remaining in electronic or electrical products that are no longer in use.

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<sup>1</sup> [https://en.wikipedia.org/wiki/Recharging\\_alkaline\\_batteries](https://en.wikipedia.org/wiki/Recharging_alkaline_batteries)

<sup>2</sup> <http://www.batteryrecycling.org.au/recycling/batteries-and-the-environment>



At the time of writing there is no national collection scheme for waste consumer batteries. However, some local councils offer drop-off facilities for waste consumer batteries, as do some retail chains. A range of metals and e-waste recovery businesses will collect commercial quantities of waste batteries. Fees may apply for the collection of commercial quantities of waste batteries.

Most state and territory governments prohibit the disposal of waste batteries to landfill, except in the case of small quantities of waste consumer batteries disposed of as household waste.

The movement of waste batteries is controlled under the National Environmental Protection Measure (Movement of Controlled Waste between States and Territories) Measure (NEPM).

#### References

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