Australian Government

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# Safely managing Australia's radioactive waste

# Australia's radioactive waste

In Australia, radioactive waste is only produced from beneficial uses of radioactive materials in medicine, research and industry - and the operation of the research reactor at ANSTO. The waste is made up of radioactive material that has no foreseeable further use. Just like car batteries, mobile phones and some household chemicals, this material requires particular procedures and methods for its management, storage and disposal.

Australian governments impose strict controls on radioactive waste management including treatment to convert the waste into a solid stable form and measurement to determine the amount of radioactivity.

At present, more than 100 sites across Australia are licenced to store low and intermediate level radioactive materials on an interim basis. This includes sites at ANSTO, as well as in metropolitan areas and regional towns and cities. Although safe, these storage conditions are temporary or not designed for disposal and long term storage. Many of those facilities are also nearing capacity.

As per international best practice, purpose-built national facility is the safest and most cost effective way to manage radioactive waste disposal and storage over the long term. The Australian Government is currently seeking an appropriate site for Australia's national radioactive waste management facility.

# Radioactive decay

***Radioactivity refers to particles or energy emitted from the nucleus of radioactive atoms.***

Radioactive decay rates are normally stated in terms of half-lives. This is the rate of decay or the time required for the radioactivity to be reduced by half. Half-lives can vary from fractions of seconds to billions of years. Radioactivity gradually diminishes as radioactive elements decay into more stable elements, so waste gradually becomes less radioactive. The time which this takes depends on the half-life of the radioactive substance involved.

## Synroc – a waste management innovation

Synroc is an Australian innovation that is a cost effective, low risk solution for the treatment of radioactive waste. Short for 'synthetic rock', it mimics the natural ability of rocks to safely lock up radioactive elements for hundreds of thousands of years.

This method is proven to significantly reduce the volume of nuclear by-products compared to other methods such as cementation, potentially saving organisations many millions of dollars.

# Australia's nuclear experts

## Nuclear research and medicine produced by the Australian Nuclear Science and Technology Organisation (ANSTO) has benefited generations of Australians since the 1960s. With benefits, come responsibilities, and the by-product of nuclear research and medicine includes radioactive waste. ANSTO responsibly manages this waste in both the long and short terms.

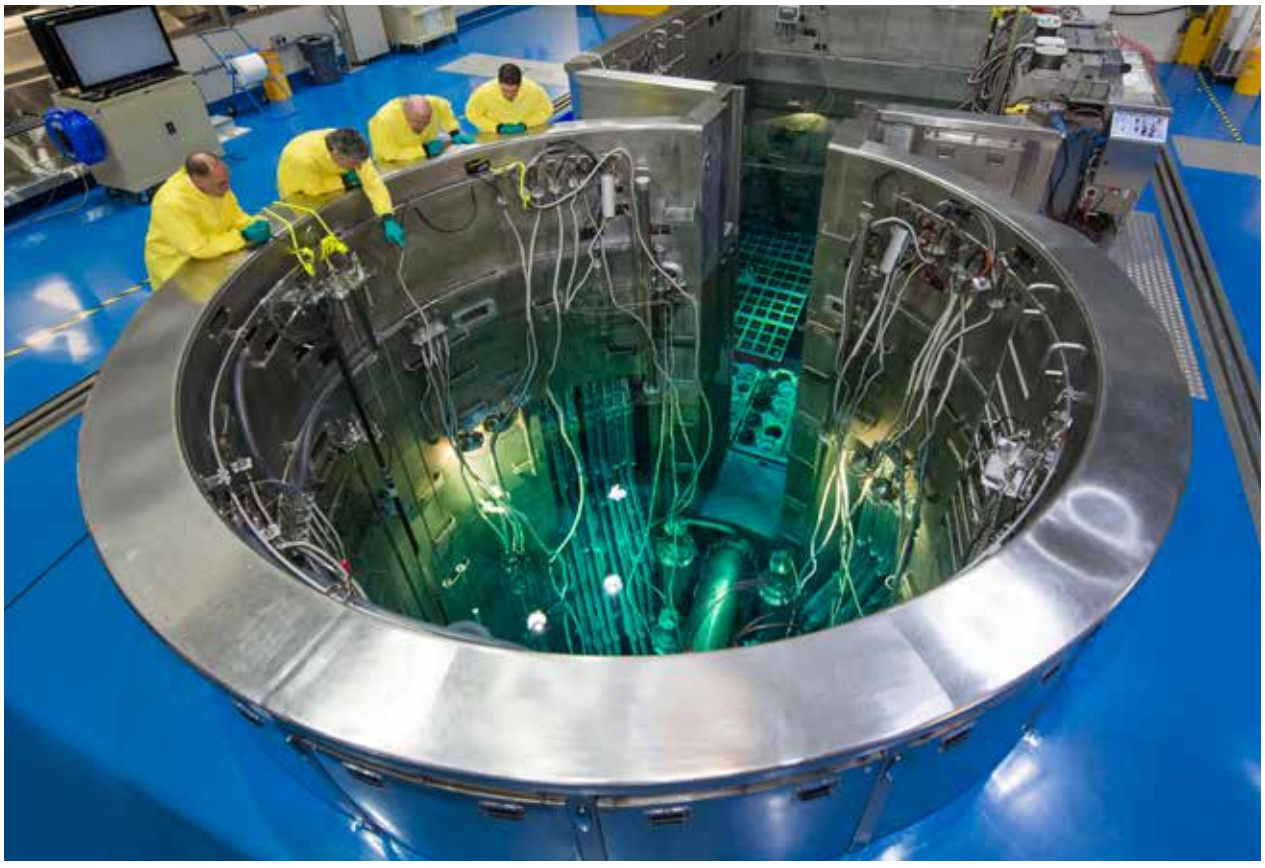
ANSTO is one of Australia's largest public research organisations and custodian of much of our country's landmark and national research infrastructure, including the OPAL multi-purpose research reactor, the Australian Synchrotron, the Centre for Accelerator Science and neutron beam instruments.

For over 60 years, ANSTO has applied nuclear techniques to answer the significant environmental, medical and industrial questions delivering benefits to all Australians.

ANSTO is central to Australia's nuclear medicine manufacturing capabilities. Each week ANSTO delivers over 10,000 patient doses of potentially lifesaving nuclear medicines to hospitals and medical practices across Australia. These nuclear medicines are used to diagnose and treat a wide range of illnesses including heart diseases, skeletal injuries, and a range of cancers. It is estimated one in two Australians will benefit from the nuclear medicines in their lifetime.

ANSTO staff have extensive skills and expertise in nuclear technology and its applications, and in particular, the handling of radioactive materials.

The OPAL research reactor is used for a range of nuclear medicine, research and industrial applications



# Types of radioactive waste

Just like any business, ANSTO produces waste. Seventy per cent of the waste produced by ANSTO is standard rubbish which is not radioactive and can be disposed of in landfill. Thirty per cent of the waste produced at ANSTO is radioactive waste - and 92 per cent of that radioactive waste is low-level waste, comprising paper, plastic, gloves, cloths and filters which contain small amounts of short-lived radioactivity.

## 92% Low-level waste

Low-level waste contains small amounts of radioactivity and does not require shielding to protect workers during normal handling or transportation.

ANSTO shreds and compresses its low-level radioactive solid waste and places it into 200 litre steel drums, which are stored on site in dedicated buildings on racks.

The radioactivity in the drums is measured using a scanning system. The drums are bar-coded and the radionuclide content of each drum is entered into a database to enable a complete record of ANSTO's radioactive wastes to be compiled and tracked at all times.

## 8% Intermediate-level waste

Intermediate-level waste at ANSTO is generated chiefly from radiopharmaceutical production and reactor operations. The waste requires shielding during handling, processing and storage. Shielding can be barriers of lead, steel or concrete. 8 per cent of ANSTO's yearly radioactive waste – or 4.5 cubic metres - is intermediate-level waste.

Intermediate-level solid waste can be shielded by barriers of lead or concrete, or stored in deep pools of purified water. ANSTO's intermediate-level solid waste is loaded into special bins and safely stored in underground shielded concrete pits located on ANSTO's site.

## 0% High-level waste

High-level waste is not produced by ANSTO. High-level waste comes from the reprocessing of used nuclear fuel from nuclear power reactors which do not exist in Australia.

# Australia's radioactive waste returned from France in 2015

For nearly fifty years - between 1958 and 2007 – ANSTO's now decommissioned HIFAR reactor enabled the production of millions of doses of nuclear medicine. The spent fuel rods from the reactor were sent to France for reprocessing. The radioactive waste was returned to Australia in December 2015, in line with international agreements around radioactive waste management.

The radioactive waste that returned from France is equivalent in volume to one third of a regular shipping container. However, the waste is immobilised in glass, shielded by lead, and is inside purpose-built storage container. People can safely stand next to the container without the need for protective clothing or equipment.

People can safely stand next to the storage container that houses the waste returning from France

# Long term storage of radioactive waste in Australia

The Australian Government is currently seeking an appropriate site for Australia's national radioactive waste management facility.

It will take several years to identify a preferred site and then design and build the facility. An Independent Advisory Panel has been convened to provide independent technical and project implementation advice to identify a site and establish a facility.

Once the national facility is in place, radioactive waste requiring long term storage from across Australia will be safely and securely transported to the facility.

For more information on the national facility please visit **www.radioactivewaste.gov.au**

## Interim storage of radioactive waste returned from France

Due to ANSTO's expertise in the safe management of radioactive materials, the Australian Government has requested that ANSTO sites and temporarily stores the returned waste until the National Radioactive Waste Management Facility is built.

Under both the *ANSTO Act* and the *National Radioactive Waste Management Act*, waste cannot be permanently stored at ANSTO's Lucas Heights campus. ANSTO is not the right location for a national facility because of the amount of land that would be needed and future land use considerations.

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# Discover more

Find out more about the important research being undertaken by ANSTO and its collaborators.

## Take a tour

ANSTO's free Lucas Heights campus tours are suitable for novices to budding scientists, where you get to see our scientists at work.

School groups are welcome and there are several excursions available.

## Bookings

02 9717 3090 tours@ansto.gov.au

## Locations

Lucas Heights | Camperdown | Clayton

**www.ansto.gov.au**

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