



Ensuring the safety of the National Radioactive Waste Management Facility

Just like other industrial by-products, radioactive waste is safe if it is managed and monitored correctly, which is what will happen at the National Radioactive Waste Management Facility.

The nuclear industry is one of the most regulated industries in Australia. The facility will be under the supervision of multiple independent Commonwealth regulators including the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Australian Safeguards and Non-Proliferation Office (ASNO).

The facility will be designed, constructed and operated in accordance with international best practice and strict safety and security policies that assure safety and security.

At all times for employees, visiting scientists and engineers, tourists, local communities and the environment will be safe, while the facility is accepting waste, during management and throughout monitoring, as well as during activities like transport.

The facility will be subject to a series of stringent licensing and approval processes at the siting, design, construction, operation, and closure stages.

An overview of the roles of the independent regulators and the approvals processes is available at www.radioactivewaste.gov.au/radioactive-waste/independent-bodies-regulations-and-checks.

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The facility will be designed and built based on advice from the best experts in the field both from Australia and overseas. As the custodian of Australia's nuclear infrastructures and expertise, the Australian Nuclear Science and Technology Organisation (ANSTO) has more than 60 years' of experience in operating nuclear facilities, including those that store radioactive waste, but does not have the room

for this National Radioactive Waste Management Facility. With its proven track record, ANSTO is providing technical advice to the Department of Industry, Science, Energy and Resources throughout the project.

Facilities similar to the proposed National Radioactive Waste Management Facility have been operating overseas for decades without any significant incidents, and the new Australian facility will be no different.

A safe facility for employees and the public

The National Radioactive Waste Management Facility will be safe to work at and safe to visit, just as similar storage facilities are in Australia, and similar storage and disposal facilities are around the world.

Outside the fence line of the facility, the level of radiation will be indistinguishable from the background radiation that every person is exposed to in our normal environment, including from our houses (e.g. construction materials such as bricks), food (e.g. bananas), and the sun, earth and atmosphere.

Members of the general public and local community, even those at the fence line, would receive no distinguishable additional radiation from the facility – either while the facility is operational, or after it has closed.

This will be ensured through the:

- design of the facility itself utilising multiple diverse engineered and natural containment barriers;
- packaging and conditioning of waste, which will need to meet approved Waste Acceptance Criteria before it is even sent to the facility; and
- safe handling practices and procedures for waste onsite.

This reflects the safe operations of ANSTO which, at its Lucas Heights campus, not only has significant radioactive waste stores, but also Australia's only operational nuclear reactor.

For those who work at the facility, the operator will adopt the 'as low as reasonably achievable' principle (commonly known as ALARA in the nuclear industry), which is in line with Australian and international best practice. As at ANSTO, an employee of the facility will receive an annual radiation dose that is many times below the limits allowed by regulation, which themselves are many times below safe limits. This will be monitored by the operator and regulator

using personal dosimeters that all radiation workers wear when working at facilities like this.

Thanks to stringent radiation controls, even the employees of the facility who work most directly with the waste their entire career will receive less than half the radiation dose of an international airline pilot, and even less than farmers growing crops in soils that have high natural levels of radioactive minerals.

Visitors to the facility will only be exposed to minute doses of radiation, many times below the allowable, safe limits set by the independent radiation protection and nuclear safety regulator, ARPANSA.

More information on radiation can be found on ANSTO's website: www.ansto.gov.au

Question: Don't all these measures show that radioactive waste is highly dangerous and unsafe?

No. Radioactive waste, like other industrial by-products, is safe when managed appropriately. The National Radioactive Waste Management Facility will follow strict safety and security procedures in line with world's best practice, and it will be subject to independent oversight from numerous Commonwealth regulators.

Having numerous layers of security and safety is exactly what guarantees the safety of the facility – because no single failure or plausible combination of events could result in a risk to people or the environment.

Radiation doses compared with other everyday scenarios

The facility design and work practices will ensure that any radiation is well below the strictly regulated and highly conservative health and safety limits, and are as low as reasonably achievable.

- **Background radiation:** the average Australian background radiation dose, from natural sources like our houses, food, and the sun, earth and atmosphere, is around 1.5 millisieverts (mSv) each year.
- **Industry workers:** the average Australian uranium miner receives an additional annual dose of approximately 1 mSv.
- **Cosmic radiation:** International airline pilots receive an average additional annual dose of approximately 4 mSv.
- **Diagnostic tests:** One CT scan of the abdomen delivers a dose of about 13 mSv.

- **Limit set by the regulator for radiation workers:** ARPANSA's yearly dose limit for a radiation worker, which is tracked by each employee's personal dosimeter, is 20 mSv (including background radiation). By comparison, ANSTO radiation workers receive an average additional dose of 1.75 mSv per year.

As these comparisons show, the additional dose received by someone working at the facility, will be far below the levels the regulator allows, as is the case with additional radiation doses received by people who work in other common professions.

The facility will be designed in full compliance with the ARPANSA Act and Regulations, and international best practices.

Prepared for all scenarios

The facility will be designed and engineered to the highest of standards, with multiple safety barriers ensuring it is prepared for and resilient to all credible scenarios. It will:

- take into account a large number of natural/geological factors e.g. likelihood and severity of possible seismic events, or flooding at the location of the facility;
- be developed with consideration of a wide range of credible accident scenarios, forming what is known as the 'design basis accidents', in accordance with international best practice;
- ensure that any potential faults or failures are detected, and all potential consequences of incidents or accidents are prevented, or minimised consistent with international best practice;
- be subject to a thorough review and approval process by independent regulatory bodies such as ARPANSA, and the Department of Agriculture, Water and the Environment;
- incorporate a wide range of engineered controls such as alarms, radiation shielding, machine guarding, and multiple fail-safes on equipment such as cranes; and

- have all policies, plans and procedures frequently reviewed and updated as necessary, to ensure at all times they remain appropriate and effective.

Operational measures will further ensure safety:

- the facility will only accept wastes that meet stringent Waste Acceptance Criteria, ensuring that they are solid, immobile and non-dispersible, and are suitable for disposal (low level waste) or storage (intermediate level waste);
- the facility will have highly developed procedures, supported by staff training and development, supervision and auditing; and
- the facility will be run to internationally-recognised quality standards for process management (QMS) and environmental management (EMS).

Business continuity and emergency planning for the facility will also include responses to a variety of routine challenges that might be faced by any business, such as loss of power to the site, loss of IT systems or security information, or unavailability of key staff.

Unforeseen events that could challenge business continuity or site safety will be addressed under business continuity and emergency planning arrangements, and where appropriate will link to state emergency arrangements.

A safe facility for the environment

The facility will not impact on the surrounding environment, and radiation doses at the fence line will be indistinguishable from background levels.

Environmental safety will be ensured by the design of the facility itself, and extensive monitoring will provide assurance to regulators and the community.

Prior to the facility being commissioned, an Environmental Impact Statement study will provide a comprehensive assessment of any potential impacts on the environment and mitigation measures, in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). When deciding if a proposed action should be approved, the EPBC Act requires that the Minister for the Environment takes into account:

- the principles of ecologically sustainable development;
- the outcomes of the assessment of the impacts of the proposed action;
- referral documentation;
- community and stakeholder comment;
- any other relevant information available on the impacts of the proposed action; and
- relevant comments from other Australian Government, and state and territory government ministers, and members of the public (such as

information on social and economic factors).

The design of the facility will ensure the protection of wildlife under the Environment Protection Plan as required by the ARPANSA Guide.

The local environment will be closely monitored to ensure compliance with regulatory and licensing requirements. Results of this monitoring will be publicly available – just as we see at ANSTO’s Lucas Heights campus. ANSTO publishes live meteorological air quality monitoring data every 15 minutes at www.ansto.gov.au/Resources/Localenvironment/Atmosphericmonitoring

Monitoring at the facility will be continuous during the operational and post-closure period, through activities such as continuous air samplers, soil sampling and boreholes. Soil and vegetative samples will be routinely collected and analysed to demonstrate that the environment surrounding the facility has not been affected in any way.

Example: Jobs in Environmental Monitoring

“You would need a science or environmental science degree to get a start in this field, and then with a combination of on-the-job training, mentoring and development, you’d quickly become able to provide the necessary monitoring services for a National Radioactive Waste Management Facility.”

Frank Harris, Chief Advisor Radiation Governance, Rio Tinto

The Safety Case

A site-specific Safety Case for the facility will be prepared, which will:

- document the approach to site safety;
- use site-specific operational scenarios to demonstrate that the facility is safe for employees of the National Radioactive Waste Management Facility and for the surrounding community;
- demonstrate the contribution of systems and engineered barriers to the multi-barrier approach to safety;
- demonstrate that the site is safe in normal operations and in design basis accidents; and
- use site-specific post-closure scenarios to demonstrate that the facility is safe for the surrounding community into the future, once operations have finished.



This document is part of a series of factsheets providing information on the process to site the National Radioactive Waste Management Facility.

For more information

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