



Australian Government
Australian Radiation Protection
and Nuclear Safety Agency



National Radioactive Waste Management Amendment (Site Specification, Community Fund and Other Measures) Bill 2020

**Submission by the Australian Radiation Protection and Nuclear Safety
Agency (ARPANSA)**

Background

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Australian Government's primary authority on radiation protection and nuclear safety. The agency protects the Australian people and the environment from the harmful effects of radiation through understanding risks, best practice regulation, research, policy, services, partnerships and engaging with the community.

ARPANSA regulates all Commonwealth uses of radiation sources and nuclear installations. Major licence holders include the Australian Nuclear Science and Technology Organisation (ANSTO), the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and the Australian Department of Defence. ARPANSA will be responsible for assessing any application for a National Radioactive Waste Management Facility (NRWMF), and welcomes the opportunity to make a submission to the Senate Economics Legislation Enquiry into the National Radioactive Waste Management Amendment Bill 2020.

The *Australian Radiation Protection and Nuclear Safety Act 1998* (the ARPANS Act) and the Australian Radiation Protection and Nuclear Safety Regulations 2018 (the Regulations)¹ form the basis for ARPANSA's licence decisions in relation to the proposed NRWMF, and for ARPANSA's publicly available guidance material developed to assist applicants for a licence for a facility for storage or disposal of radioactive waste. The object of the ARPANS Act is to "*protect the health and safety of people, and to protect the environment, from the harmful effects of radiation*". This object will be the focus of ARPANSA's licence decisions in relation to all potential licence applications and licensing stages for the NRWMF; i.e. licences to *prepare a site, to construct, to operate* and – at a later stage – to *decommission* the facility.

¹ <https://www.arpansa.gov.au/regulation-and-licensing/regulation/about-regulatory-services/why-we-regulate/arpans-legislation>

Australia is a Contracting Party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management² (the Joint Convention). ARPANSA prepares the National Reports on implementation of the Joint Convention and, on behalf of Australia, submits these reports for review by all Contracting Parties at the Review Meetings held every third year. Australia's most recent report was submitted in October 2017³. The National Reports include up-to-date inventories of radioactive waste. A significant fraction of the national waste holdings is held by the Commonwealth under licences issued by ARPANSA. The NRWMF plays a key role in the framework for its management.

The ARPANS Act interfaces with the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). Approval is required under both Acts in order for the applicant to prepare a site for the NRWMF. ARPANSA is engaging with the Department of Agriculture, Water and the Environment to enable, to the maximum extent possible, coordination of the two pieces of legislation during review and assessment of licence applications.

The plans for final management of Australia's radioactive waste are outlined in the Australian Radioactive Waste Management Framework⁴ (ARWMF). ARPANSA notes that the ARWMF considers the establishment of two facilities for the final management of radioactive waste. These are the NRWMF for disposal of low level radioactive waste⁵ (LLW) and storage of intermediate level radioactive waste (ILW), which is currently pursued and the subject of the Amendment Bill. The second facility is a disposal facility for ILW, where the ARWMF states: "*a separate process [from that of selecting a site for the NRWMF] will be put in place to develop a permanent disposal facility for ILW (an Intermediate Level Waste Disposal Facility or ILWDF).*"

ARPANSA wants to emphasise that national solutions should be sought, plans developed and facilities established for *all* radioactive waste stored, and over the coming years generated, in Australia; this will contribute to elimination of the need for specific storage facilities where radioactive waste may accumulate over a long periods of time without a defined disposal pathway – or any disposal facility in sight⁶.

Purpose and scope of this submission

ARPANSA does not have specific comments on the Amendment Bill *per se*, as the Bill does not relate to the health and safety criteria that are core to any review and assessment under the ARPANS Act and Regulations. It is also premature for ARPANSA to comment on the suitability of the specified site at Napandee, near Kimba in South Australia. The site, the design of the facility and the plans and arrangements for managing safety will be considered in ARPANSA's review and assessment of an application for a licence to prepare a site for the facility.

² Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, <https://www.iaea.org/topics/nuclear-safety-conventions/joint-convention-safety-spent-fuel-management-and-safety-radioactive-waste>

³ Available at ARPANSA's website, <https://www.arpansa.gov.au/about-us/what-we-do/international-collaboration/joint-convention/previous-reports>

⁴ <https://www.industry.gov.au/data-and-publications/australian-radioactive-waste-management-framework>

⁵ See Safety Guide for *Classification of Radioactive Waste*, Radiation Protection Series No. 20, ARPANSA 2010 (to be replaced by a revised version, RPS G-4). <https://www.arpansa.gov.au/regulation-and-licensing/regulatory-publications/radiation-protection-series/guides-and-recommendations/rps20>

⁶ Note that operational stores will always be required; such *temporary* storage is part of standard waste management practices.

The purpose of this submission is two-fold:

- To provide information and explanation/clarification regarding ARPANSA's decisions in relation to waste generation, waste facilities and waste stores of relevance to the NRWMF, in particular ILW stored and generated by holders of a licence issued by ARPANSA. This relates primarily to ANSTO, CSIRO and ARPANSA's own holdings of legacy waste arising from the operations of the Australian Radiation Laboratory (ARL) and its predecessors⁷.
- To briefly outline the requirements ARPANSA places on information to be submitted by an applicant for a licence for a radioactive waste storage or disposal facility.

The scope of this submission does not cover radioactive waste generated and/or stored under state and territory jurisdiction.

Commonwealth waste holdings - role of the NRWMF

ANSTO

The Interim Waste Store (IWS) Facility is a storage facility designed and built for storing ILW arising from overseas reprocessing⁸ of spent fuel from the High Flux Australian Reactor (HIFAR). The first batch of this radioactive waste was received from AREVA's (now ORANO) facilities in La Hague, France in December 2015. ARPANSA licensed ANSTO to prepare a site for, and to construct the IWS in 2013, and subsequently to operate the facility in 2015⁹.

A strict deadline of end of 2015 was enforced for the repatriation, under an agreement between the Governments of Australia and France. In the early 2010s it became obvious that the NRWMF would not be established in time for receiving the repatriated waste. Hence, the IWS was designed and constructed as a contingency solution. The bulk of the activity in the repatriated waste is immobilised in a glass matrix and contained in a dual-purpose (transport and storage) TN-81 cask; and the remainder technological waste is made up of less active material in cemented form.

Additional ILW remains in the UK from reprocessing of HIFAR spent fuel, and is planned to be returned to Australia in 2022. Should the shipment take place at that time, the NRWMF will (again) not be available, which in all likelihood leaves Lucas Heights as the preferred (by ANSTO) option, and possibly the only feasible destination. ARPANSA is aware that the waste in this second shipment is likely to be immobilised and contained in a TN-81 cask with considerably less activity content than the first cask. ARPANSA expects an application from ANSTO for approval to make a change with significant implications for safety under section 63 of the Regulations¹⁰, supported by a revised safety analysis report and an updated safety case,

⁷ ARPANSA was established in 1998 through a merger of the Australian Radiation Laboratory in Melbourne and the Nuclear Safety Bureau in Sydney.

⁸ A chemical process by which fissile material (uranium and plutonium) is separated from fission products for which no further use is foreseen and therefore considered waste; this waste is repatriated.

⁹ The CEO's Statement of Reasons is at

https://www.arpansa.gov.au/sites/default/files/legacy/pubs/regulatory/ansto/SOR_operationIWS.pdf

¹⁰ Section 63 states a licence holder must obtain approval from the CEO before changing anything described in the application for the licence or modifying the controlled apparatus, controlled material or controlled facility described in the licence.

well in advance of the time the second shipment is intended to be loaded on a vessel for shipment to Australia.

Production of molybdenum-99 in the ANSTO Nuclear Medicine Facility (ANM). ANSTO received a licence to operate the ANM Facility on 12 April 2018. In the facility, molybdenum-99 (Mo-99; a fission product) is extracted from uranium plates that have been irradiated in the OPAL reactor. The immediate decay product of Mo-99 is technetium-99m (Tc-99m), used in the majority of nuclear medicine procedures in Australia and overseas. ANSTO was authorised to commence routine production for the domestic and international nuclear medicine markets on 24 May 2019.

The liquid residue from the Mo-99 extraction and purification process is classified as ILW. The storage tanks at the ANM can accommodate six years of Mo-99 production. ANSTO's intention is to immobilise the radioactive substances in the liquid waste in an inert ceramic matrix in a planned facility at Lucas Heights known as the SyMo Facility. ANSTO received ARPANSA's authorisation to prepare a site and construct the facility in 2014¹¹. Construction is under way and an application for a licence to operate the facility is preliminarily expected by mid-2021.

Implications of ILW generation and storage at Lucas Heights for the NRWMF. The licence decisions regarding the IWS were predicated on the fact that the intended storage facility (the NRWMF) was not available; that no alternative interim solution other than the IWS was feasible; and that there was some urgency as Australia was under obligations to enable repatriation from France before the end of 2015. Furthermore, there was at the time of the decision no consideration given to *disposal* of ILW in the national plans, only to storage. The *Australian Nuclear Science and Technology Organisation Act 1987*¹² prevents disposal of waste at the ANSTO premises at Lucas Heights; this is supported by ARPANSA. The CEO of ARPANSA, therefore, imposed a condition on the licence to operate the IWS which requires ANSTO to provide plans for the final management of the waste held in the IWS: "*the licence holder must submit to the CEO, no later than 30 June 2020 and in a form acceptable to the CEO, plans for the removal of waste stored in the facility.*"

Likewise, the CEO included a condition in the licence to operate the ANM Facility that requires ANSTO to report by 30 June 2020 on, *inter alia*: plans for storage and disposal of the ILW, and contingency plans should one or several components of the ILW management system not eventuate or fail. This condition complements the condition issued with the IWS licence.

ARPANSA is aware that some stakeholders have interpreted ARPANSA's decisions regarding the IWS as a requirement for relocation of the waste stored in the IWS, even suggesting that there is an urgent need for relocation. This is not correct. ARPANSA has not raised safety concerns regarding storage of waste at the IWS. ANSTO seems to share this view. ANSTO has indicated to ARPANSA that the mandatory recertification of the TN-81 casks every 10 years can be carried out at the IWS; and in response to a request for identification of contingency measures in the short to medium term, ANSTO Identified the following:

- Retention of the returned residues at ANSTO until the availability of a final disposal option

¹¹ The Statement of Reasons of the Delegate to the CEO is at <https://www.arpansa.gov.au/sites/default/files/legacy/pubs/regulatory/ansto/SOR-SyMo.pdf>

¹² <https://www.legislation.gov.au/Details/C2012C00046/Html/Text>

- Retention of the returned residues at ANSTO until the availability of the NRWMF for storage

During the licensing process of the ANM Facility, the CEO received assurances in a letter from the then Deputy Prime Minister and Minister for Resources and the Northern Territory that *"a separate process for the disposal of ILW will commence once this work [establishment of the NRWMF] is completed, noting that it will occur at a different and suitable site from the NRWMF"*. As mentioned earlier, plans for establishing a disposal facility for ILW are now included in the ARWMF, which has eliminated one of the concerns with continued generation of ILW at Lucas Heights.

Regarding the ILW planned to be processed in the SyMo facility, ARPANSA anticipates that information on storage, including whether this would involve the NRWMF, is included in the forthcoming report developed by ANSTO, in compliance with the condition issued with the operating licence for the ANM facility.

Radioactive Waste at Woomera

CSIRO holds just under 10,000 drums of waste at the Woomera Prohibited Area. CSIRO currently estimates that less than 200 of these barrels would require management at a future NRWMF. These 200 barrels are estimated to be LLW, with no ILW currently detected. These drums are undergoing characterisation work to improve the inventory of waste held. ARPANSA has been monitoring CSIRO's characterisation work since 2016. This includes environmental monitoring of radiation levels. CSIRO is developing a pilot program to test new methods to manage their waste, however, this will require ARPANSA's approval prior to implementation.

Radioactive Waste at ARPANSA

ARPANSA has custody of approximately 68 m³ of radioactive waste, being legacy waste from activities carried out by the ARL and its predecessors at a time these organisations were involved in production of radiopharmaceuticals. The waste will be kept in safe storage until such time it can be safely disposed of in a suitable facility.

About half of the waste is stored at ARPANSA's premises in Melbourne, comprising 137 x 220 litre steel drums (i.e. approximately 30 m³). Most of these drums are filled with building material contaminated with radium. This material was recovered from the decontamination and subsequent demolition of the former Commonwealth Radiation Laboratory (one of ARL's predecessors) in Melbourne. About 27 m³ could be considered LLW, with the remaining three m³ considered ILW due to its radium content.

The waste at the Defence site comprises 76 x 220 litre steel drums (i.e. approximately 15 m³) and 42 x 540 litre High Integrity Containers (i.e. approximately 23 m³). Much of this waste is a mixture of disused medium-lived radioactive material (cobalt-60, cesium-137 and strontium-90) and long-lived laboratory waste from the operations of the ARL and the Materials Research Laboratory. There are also a number of drums and containers enclosing consumer materials recovered from the public, such as watches and compasses with radium dials and luminous paints containing radium. About 27 m³ could be considered LLW, whereas about 11 m³ could be considered ILW.

ARPANSA will establish arrangements so that ARPANSA's waste holdings can be managed in a way that eliminates any conflict of interest in the licence decisions regarding the NRWMF. ARPANSA's current radioactive waste generation is very minor, amounting to less than 1 m³ laboratory waste per decade.

ARPANSA's requirements for a licence application for the NRWMF

The requirements ARPANSA places on an applicant for a licence for a radioactive waste storage or disposal facility are in accordance with the ARPANS Act and Regulations, regulatory guides and ensures that international best practice is considered.

The licence requirements are extensive and can be found in the ARPANSA Regulatory Guide: [Applying for a Licence for a Radioactive Waste Storage or Disposal Facility, REG-LA-SUP-240L v3.1 January 2019](#). In addition, any disposal facility for solid radioactive waste should meet the requirements set out in nationally agreed Radiation Protection Series (RPS) C-3 [Code for Disposal Facilities for Solid Radioactive Waste 2018](#). The Advisory Note¹³ to RPS C-3 outlines the application of the concept of health risks for the public, and the need to consider both the probability of an event and the consequences of an event in the safety case and in mitigating health risks.

While the details are available in the documents referred to above, ARPANSA emphasises the importance of the *safety case* as the foundation for both decision-making and consultation with interested parties. This is further discussed below, in abbreviated form based on the above-mentioned regulatory guide.

2.1 The safety case

Objective of the safety case: The applicant should prepare and maintain a *safety case* that allows for a full understanding of all aspects relevant to the safety of the controlled facility; it should contain references to supporting material. It should be in a form suitable to be used as the basis for consultation with all stakeholders on the safety of a facility for storage or disposal of radioactive waste as well as any ancillary facilities that may be part of the system for waste management.

The safety case should outline all safety-related arguments the applicant draws on in support of the application. It should include information on the consultation activities undertaken by the applicant prior to seeking a licence and during development of the safety case and what conclusions have been drawn from such consultation. The safety case is a living document; specific elements will continue to be relevant for sequential licensing stages and need to be updated in the safety case.

A major component of the safety case is the *safety assessment*, which includes the *safety analysis*. Important elements of the safety assessment are radiological impact on humans and the environment, site and engineering aspects, operational safety, non-radiological impacts, and the management system. Safety should be achieved by applying the principles of defence in depth, optimisation of protection, and, as relevant, through the use of best available technique. The safety analysis is the evaluation of the potential hazards associated with a facility or activity, documented in a safety analysis report (SAR).

The safety case will be the main source of information for stakeholders during the consultation phase. As such, the CEO will require a summary of the safety case in plain non-technical language, to facilitate communication and consultation.

¹³ Dose and risk criteria for protection of people following the closure of a disposal facility for radioactive waste.
<https://www.arpansa.gov.au/regulation-and-licensing/regulatory-publications/radiation-protection-series/codes-and-standards-0>

As there is an obligation on the CEO to take international best practice into account in regulatory decision-making, it is incumbent on the applicant to demonstrate how international best practice has been considered in the safety case. Information on international risk assessments and standards that are relevant in this context is available at ARPANSA's website. A licence application should also draw on relevant design concepts, operational experience, and decommissioning and closure experience from facilities in other countries with an advanced infrastructure for safety.

The safety case should acknowledge the existence of any unresolved issues and should provide information on work proposed to resolve these issues in future stages of the licensing process. Issues that have been resolved with ARPANSA and other stakeholders should be documented and form part of the safety case.

The safety of transport to, from and between radioactive waste management facilities should also be considered noting that the responsibility for transport of waste to a storage or disposal facility lies with the waste owner. This may require prior approval of a transport safety and/or security plan by ARPANSA.

It is expected that the safety case will be updated for each stage of licensing or otherwise as required by the CEO of ARPANSA. For each stage, it should provide enough information about the subsequent licensing stages to allow for an informed decision on the feasibility of the storage and/or disposal concept, as well as of the system for radioactive waste management. With each new licensing stage, the safety case will become increasingly informed by experience gained during previous stages and by safety and security reviews, if any such review has been performed.

For a storage facility, the safety case should outline plans for the final management of the waste in storage, including its disposal.

The applicant is encouraged to implement a graded approach and direct efforts and resources to the matters that are most significant for protection of the health and safety of people, and of the environment.

Concluding remarks

Although ARPANSA has no formal role in the pre-siting stage of the NRWMF, it has been proactive in preparing to receive a licence application. This has involved extensive stakeholder engagement, including with other relevant Australian Government Agencies such as the Department of Industry, Science, Energy and Resources and the Department of Agriculture, Water and the Environment, and potential host communities to clarify the role of the regulator. In addition, ARPANSA has produced regulatory guidance on the NRWMF for applicants as described above, and also information for stakeholders which can be found at:

<https://www.arpansa.gov.au/sites/default/files/rad-waste-info-for-stakeholders.pdf>