

Submission

Parliament of
New South Wales
Joint Select
Committee on the
Transportation
and Storage of
Nuclear Waste

Australian Radiation Protection and
Nuclear Safety Agency
2003

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SUBMISSION TO THE PARLIAMENT OF NEW SOUTH WALES JOINT SELECT COMMITTEE INQUIRY ON THE TRANSPORTATION AND STORAGE OF NUCLEAR WASTE

1. Summary

The Joint Select Committee on the Transportation and Storage of Nuclear Waste is required to consider and report upon proposals by the Commonwealth Government to transport nuclear waste through and potentially store nuclear waste within New South Wales.

The *Australian Radiation Protection and Nuclear Safety Act 1998* (the *ARPANS Act*) prohibits a Commonwealth *controlled person* from dealing with radioactive sources unless authorised by a source licence issued by the CEO of ARPANSA. 'Dealing with' includes transporting a source.

Similarly the Act prohibits a controlled person from preparing a site for, constructing or operating a controlled facility unless authorised by a facility licence issued by the CEO of ARPANSA.

The Commonwealth's proposals for a national low level radioactive waste repository (NRWR) and the national store for long-lived intermediate level waste (National Store) would each be a controlled facility and would require a facility licence. Transport of materials may also be regulated through source licences issued by the CEO of ARPANSA.

The matters that are the subject of the Committee's terms of reference are thus largely subject to regulatory decision-making by the CEO of ARPANSA under the *ARPANS Act*. The submission describes the legislative and regulatory framework for decision-making by the CEO of ARPANSA.

With regard to transporting radioactive sources by a Commonwealth controlled person, a central feature of the CEO's regulatory requirements is adherence to the *Code of Practice for the Safe Transport of Radioactive Material 2001* (the *Code*). This Code, which is being accepted by Australian jurisdictions, applies the internationally accepted *Regulations for the Safe Transport of Radioactive Material 1996 Edition (Revised)* drawn up under the auspices of the International Atomic Energy Agency (IAEA). The submission describes the basic approach to assuring the safe transport of radioactive material embodied in the *Code*.

The submission points to the waste acceptance criteria likely to apply for acceptance of waste at the NRWR – which will be derived from guidance for near surface disposal of wastes as embodied in the *NHMRC Code of Practice for the Near Surface Disposal of Radioactive Waste 1992* (the *Near Surface Disposal Code*) and international guidance. These criteria will limit the radioactivity and radioactivity concentration in any package suitable for disposal at the repository and being transported to the repository.

Turning to the Commonwealth proposal for a National Store, the submission describes in broad terms the approach that ARPANSA will take in assessing such a proposal.

2. Legislative and Regulatory Framework

The statutory office of the Chief Executive Office of ARPANSA and the statutory agency of ARPANSA were created under the *ARPANS Act*, which commenced on 5 February 1999. The object of the Act is to protect the health and safety of people, and to protect the environment from the harmful effects of radiation.

Specifically, ARPANSA is responsible for:

- i) regulating all Commonwealth entities (including departments, agencies and bodies corporate) and Commonwealth contractors either dealing with radioactive material or apparatus or undertaking conduct in relation to nuclear installations or prescribed radiation facilities;
- ii) providing advice to Government and the community on radiation protection and nuclear safety;
- iii) undertaking research and providing services in relation to radiation protection, nuclear safety and medical exposures to radiation; and
- iv) promoting uniformity of radiation protection and nuclear safety policy and practices across jurisdictions of the Commonwealth, the States and the Territories.

The Act applies to controlled persons¹ in regard to controlled material², controlled apparatus³ and controlled facilities.

Section 31 of the *ARPANS Act* prohibits a controlled person from dealing with a controlled material, or controlled apparatus, unless the dealing is authorised by a source licence issued by the CEO. Section 13 of the Act defines the phrase 'deal with' as meaning the following:

- i) possess, or have control of, the apparatus or material;
- ii) use or operate the apparatus, or use the material;
- iii) dispose of the apparatus or material.

Section 30 of the *ARPANS Act* also prohibits a controlled person from undertaking the following conduct unless the person is authorised under a facility licence issued by the CEO:

- i) prepare a site for a controlled facility;
- ii) construct a controlled facility;
- iii) have possession or control of a controlled facility;
- iv) operate a controlled facility;
- v) de-commission, dispose of or abandon a controlled facility.

A controlled facility is either a nuclear installation or a prescribed radiation facility. The definition of nuclear installation in the *ARPANS Act* and Regulations applies to the proposed NRWR and the National Store. Therefore, these facilities will require a facility licence from the CEO for any of the conducts listed,

1 Controlled person means any of the following: a Commonwealth entity, a Commonwealth contractor, a person in the employee of a Commonwealth contractor, a person in a prescribed Commonwealth place.

2 Controlled material means any natural or artificial material whether in solid or liquid form, or in a gas or vapour, which emits ionizing radiation spontaneously.

3 Controlled apparatus means any of the following: (a) an apparatus that produces ionizing radiation when energised or that would, if assembled or repaired, be capable of producing ionizing radiation when energised; (b) an apparatus prescribed by the regulations that produces harmful non-ionizing radiation when energised.

In deciding whether or not to issue a facility or source licence, the Act and Regulations require that the CEO must take into account the following significant matters:

- i) international best practice in relation to radiation protection and nuclear safety as it relates to the licence application
- ii) whether the information establishes that the proposed conduct can be carried out without undue risk to the health and safety of people, and to the environment; and
- iii) whether the applicant has shown that there is a net benefit from carrying out the conduct relating to the controlled facility; and
- iv) whether the applicant has shown that the magnitude of individual doses, the number of people exposed, and the likelihood that exposure will happen, are as low as reasonably achievable, having regard to economic and social factors; and
- v) whether the applicant has shown a capacity for complying with these regulations and the licence conditions; and
- vi) if the application is for a facility licence for a nuclear installation — the content of any submissions made by members of the public about the application.

In relation to the transportation of controlled material or controlled apparatus by a controlled person, this activity falls within the term 'deal with' because the person has possession or control of the controlled material or controlled apparatus. Consequently, the activity needs to be authorised under a source licence. Similarly, it is expected that over the life of a facility, that the licence holder or a person covered under the licence will need to transport or dispose of radioactive material being either part of the construction of the facility or a product or by-product of the facility.

A source licence or facility licence is issued by the CEO subject to statutory conditions and possibly additional conditions imposed by the CEO in respect of matters not otherwise addressed. These statutory conditions are set out in Attachment A

The CEO has inspection and enforcement powers at his disposal to monitor and enforce compliance with the *ARPANS Act* and Regulations. These powers are set out in Parts 5 and 7 of the *ARPANS Act*.

3. Code of Practice for the Safe Transport of Radioactive Material

The *Code* is a document adopted by the CEO of ARPANSA after receiving the advice of the Radiation Health and Safety Advisory Council⁴. It was prepared under the auspices of the Radiation Health Committee, which is a body established by the *ARPANS Act*, which includes 'radiation control officers' from each State and Territory.

The current Code is in its essentials the 1996 Edition (Revised) of the *Regulations for the Safe Transport of Radioactive Material* adopted as a Safety Standard by the IAEA.

The *Code* is mentioned in the Regulations (Regulation 62A) which requires that the practices and procedures described in the mentioned Codes must, to the extent that they are relevant, be

⁴ The Radiation Health and Safety Advisory Council is established by section 19 of the *ARPANS Act*. Its functions are, inter alia, 'to advise the CEO on the adoption of recommendations, policies, codes and standards in relation to radiation protection and nuclear safety.'

followed by controlled persons. The Code is also mentioned as a statutory licence condition in Regulation 48. Thus, relevant Commonwealth activities are effectively regulated under the provisions of the *Code*.

State and Territory jurisdictions have adopted the *Code*, with the current exceptions of Victoria and South Australia. These jurisdictions are moving to adopt the *Code* – ARPANSA is advised that South Australian regulations are expected shortly; Victoria is still progressing the necessary regulatory requirements.

For the transport of radioactive material by air and sea, the IAEA transport regulations become law due to Australia's ratification of the Chicago and SOLAS Conventions respectively, which both contain annexes relating to the safe transport of dangerous goods, of which radioactive materials are one class. New editions of the IAEA transport regulations are automatically picked up with 2 yearly revisions of these annexes.

The *Code* is a complex and detailed technical document. The best description of the objective of the *Code* may be found in advisory material published by the IAEA in association with the Code⁵. It states that:

'In general the Regulations aim to provide a uniform and adequate level of safety that is commensurate with the inherent hazard presented by the radioactive material being transported. To the extent feasible, safety features are required to be built into the design of the package. By placing primary reliance on the package design and preparation, the need for any special actions during carriage, i.e. by the carrier is minimized. Nevertheless, some operational controls are required for safety purposes.'

To put it at its simplest, the *Code* first establishes some general provisions about a radiation protection program, emergency response, quality assurance, compliance assurance and allows for special arrangements. It describes some basic requirements for packages in which radioactive materials may be transported. It then specifies a number of package types of varying degrees of robustness and sets out the limits for the activity and activity concentration of the different radionuclides and forms of material that might be contained within such a package. The description is complicated because of the differing package types and because 'the package' includes the packaging and the form of the radioactive contents. Controls on the design and use of the package, and its required strength, increase as the hazardous nature of its radioactive contents increases.

Packaging toughness is measured by its ability to withstand various conditions of transport – these are routine conditions (incident free); normal conditions (minor mishaps); and accident conditions.

After the package, the next level of safety derives from active controls. These include: labeling; marking and placarding; loading, stowage, storage and segregation provisions; quality and compliance assurance inspections.

Within the *Code*, there are defined roles for the *competent authority*, effectively the radiation regulator for the transport. ARPANSA is listed as the Commonwealth competent authority.

⁵ Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, IAEA, Safety Standards Series, TS-G-1.1 (ST-2)

Attachment B describes more detailed features of the *Code*.

4. The Proposed National Low Level Radioactive Waste Repository

At the time of writing this submission, the CEO of ARPANSA has not received any applications for licence from the Commonwealth Department of Education, Science and Training in relation to the proposed NRWR.

In assessing any licence application, the CEO will take into account the matters described in section 2 of this submission.

The NRWR is a nuclear installation as defined by the *ARPANS Act* and Regulations. The Regulations require that as soon as practicable after receiving any applications for facility licence, the CEO must publish a notice in a national newspaper (and the *Gazette*) that the applications have been received and that the CEO intends to make a decision on it. The notice invites people and bodies to make submissions about the application and sets a period and procedures for making submissions. The CEO in making a decision on any licence application must take into account the content of those public submissions.

The process that the CEO is planning to carry out for the assessment of licence applications for the NRWR is set out at Attachment C.

Central features of any applications for a licence for the NRWR are the *waste acceptance criteria* that are proposed. These will include radioactivity limits and packaging arrangements.

From the information presented in the Environmental Impact Statement, the NRWR appears designed to comply with the *Near Surface Disposal Code* or similar standards. As guidance, the appendix to this Code defines activity concentration limits for the disposal of various categories of waste in an arid environment.

It is also clear that the waste will be transported in packages suitable for both transport to, and disposal at, the proposed NRWR – principally 205 litre mild steel drums with a lid held on by a band secured with a bolt.

Although the details of transport packages to be used for the transport of low level and short-lived intermediate level radioactive waste to the proposed NRWR are yet to be specified, it is probable that they would contain predominantly low specific activity material, or surface contaminated objects. For such items, the Code requires that the transport packages meet the requirements for the Industrial Package Types 1,2 or 3 as described in Attachment B. For the transport of spent sealed sources for disposal at the NRWR, the transport package may be either a Type A or Type B package.

Combustible solids to be transported within Industrial Packages, such as compressed contaminated gloves and paper that are not within a solid (eg. concrete) matrix, have a total activity limit as specified in the *Code*. For Type A packages and Type B packages the activity limits are also specified in the *Code*.

There is no activity limit for the radioactive material being transported in an Industrial Package if the material is non-combustible solids, which would be the case for a major portion of radioactive waste destined for the NRWR.

Hence the waste acceptance criteria for the majority of Industrial Packages destined for the proposed NRWR is likely to be determined using guidance along the lines provided in the *Near-Surface Disposal Code*, and not by the package activity limits specified in the *Code*. That is to say, the package activity limits flowing from the waste acceptance criteria for these materials are, in most cases, likely to fall well below the package activity limits laid out in the *Code* or derived from dose rates specified in the *Code*.

For the combustible solids in Industrial Packages, and the radioactive waste in Type A and Type B packages, the activity concentration limit is set by the *Code*.

5. Proposed National Store for Long-Lived Intermediate Level Radioactive Waste

Radioactive material, not satisfying the disposal requirements of the *Near-Surface Disposal Code*, could be suitable for storage at the proposed National Store pending ultimate disposal. The Commonwealth proposal for a store for Commonwealth waste of this kind would be subject to the provisions of the *ARPANS Act*.

The proposed National Store would also be a nuclear installation under the *ARPANS Act* and similar processes for assessment of any applications for licence would be undertaken as apply to the NRWR (ie prepare a site, construct, operate and or possess and control).

The transport of radioactive waste to such a National Store would be undertaken in accordance with the requirements of the *Code*.

Although the details of transport packages to be used for the transport of intermediate level radioactive waste to a National Store are yet to be specified, it is probable that at least some of the radioactive material would be transported in Type B(U) transport packages, although Type A and Type B(M) packages may be used for special circumstances. Shipments under the 'special arrangement' provisions of the *Code* may also occur.

The physical design and testing requirements of Type B(U) packages (as described in the *Code* and summarised in Attachment B) are examples of passive safety. Active safety further enhances the overall safety of the transport of radioactive waste to a National Store, and would include such things as approval of the package design by a competent authority. For Type B(M) packages, special arrangement shipments, and shipments containing fissile material, additional approval by the competent authority of the shipment and transport route is also required by the *Code*.

ATTACHMENT A

Statutory Licence Conditions

Regulation 44	The licence holder must take all reasonably practicable steps to prevent breaches of licence conditions
Regulation 45	The licence holder must investigate suspected breaches of licence conditions. If a breach is identified, the licence holder must rectify the breach and any of its consequences as soon as reasonably practicable. The licence holder must also inform the CEO about the breach as soon as reasonably practicable.
Regulation 46	The licence holder must take all reasonably practicable steps to prevent accidents involving controlled material, controlled apparatus or controlled facilities described in the licence. If an accident happens, the licence holder must take all reasonably practicable steps to control the accident, minimise its consequences (including injury to any person and damage or harm to the environment), tell the CEO about the accident within 24 hours of it happening and submit a written report within 14 days.
Regulation 47	Excepting the kind of controlled apparatus mentioned in Regulation 4, the holder of a licence must ensure that conduct and dealings with controlled materials, controlled apparatus and controlled facilities comply with the <i>National Standard for Limiting Occupational Exposure to Ionizing Radiation</i> .
Regulation 48	Excepting the kind of controlled apparatus mentioned in Regulation 4, the holder of a licence must ensure that conduct and dealings with controlled materials, controlled apparatus and controlled facilities are in accordance with: <ol style="list-style-type: none"> 1. the <i>Recommendations for limiting exposure to ionizing radiation</i>; and 2. the <i>Code of Practice for the Safe Transport of Radioactive Material</i>. <p>A downloadable copy of the <i>Code</i> is available at http://www.arpana.gov.au/rps_pubs.htm.</p> <p>The holder of a licence must also ensure that dealings with the disposal of controlled material and controlled apparatus are in accordance with the following Codes of Practice:</p> <ol style="list-style-type: none"> 1. the <i>Code of Practice for the Disposal of Radioactive Waste by the User</i>; 2. the <i>Code of Practice for the Near-Surface Disposal of Radioactive Waste in Australia</i>; 3. the <i>Code of Practice for the Safe Transport of Radioactive Material</i>.
Regulation 49	The holder of a licence must ensure that all dealings with controlled material and controlled apparatus, and all activities related to controlled facilities, comply with the plans and arrangements for managing safety of the source or facility mentioned in the licence application.
Regulation 50	The holder of a licence must, at least once every 12 months, review and update any plans and arrangements for managing the controlled facility, controlled material or controlled apparatus to ensure the health and safety of people and protection of the environment. The licence holder must give the CEO information about the review.
Regulation 51	The holder of a licence must seek the CEO's prior approval to make a relevant change that will have significant implications to safety.
Regulation 52	The holder of a licence may make a relevant change that is unlikely to have significant implications for safety without the CEO's approval. However, the CEO must be told about the changes at least once every 3 months.
Regulation 53	The holder of a licence must only dispose of controlled material or controlled apparatus with the approval of the CEO. If the licence holder transfers controlled material or controlled apparatus

	<p>to the possession of another person or body, the holder of the licence must, within 7 days of the transfer, tell the CEO:</p> <ol style="list-style-type: none"> 1. that the transfer has happened; and 2. the name of the other person or body; and 3. the number of the licence held by the other person or body; and 4. the location of the controlled material or controlled apparatus after the transfer. <p>A licence holder must not dispose of, or transfer to the possession of another person or body, a controlled facility without the CEO's approval.</p>
Regulation 54	The holder of a licence, or a person covered by a licence, must not construct an item that is important for safety, and that is identified in a safety analysis report, as part of the construction of a controlled facility, unless the CEO has given the holder, or the person, approval to construct the item.
Regulation 55	The holder of a licence, or a person covered by a licence, must not load nuclear fuel into a controlled facility, unless the CEO has given the holder, or the person, approval to load the fuel.

Attachment B

Code of Practice for the Safe Transport of Radioactive Material 2001

In the Australian *Code of Practice for the Safe Transport of Radioactive Material 2001*, based on the IAEA Safety Standard TS-R-1 and used worldwide, there are eight categories of packaging used to transport radioactive material. These are:

1. Excepted Package – typically used to transport small amounts of radioactive material often associated with a calibration device within a scientific instrument;
2. Industrial Package Type 1 (Type IP-1) – typically used to transport ‘low specific activity’ (LSA) radioactive material of Category I, such as naturally occurring ores containing uranium, or ‘surface contaminated objects’ (SCO) of Category 1;
3. Industrial Package Type 2 (Type IP-2) – typically used to transport liquids with low concentrations of tritium or other radioactive liquids, or low activity solids and gases;
4. Industrial Package Type 3 (Type IP-3) – typically used to transport consolidated wastes (excluding powders) where the radioactive material is essentially uniformly distributed throughout a solid binding agent (such as concrete);
5. Type A Package – typically used for the transport of medical isotopes, and smaller industrial isotopes;
6. Type B(U) Package – typically used for the transport of higher activity radioactive material, such as those used in industry and for research and for which unilateral approval by a competent authority is required;
7. Type B(M) Package – typically used to transport high activity radioactive material where the type of radioactive material or its physical or chemical properties, requires that multilateral approval be obtained from two or more competent authorities; and
8. Type C Package – intended to be used for the transport of large amounts of radioactive material, including fissile material, by air.

For Industrial Packages Type 2 and Type 3, and for Type A packages, the package is required to maintain its integrity under normal (ie minor incidents) conditions of transport.

For Type B(U), B(M) and Type C Packages, the package is designed and tested for routine, normal and accident conditions of transport.

The transport packages have defined safety features, and for radiation safety these involve restrictions on the external radiation dose rate and the total activity (or activity concentration) of the material incorporated in the package.

The radiation levels for Industrial Packages are to be below 10mSv/h at 3 meters from the surface of the unshielded material or object. This requirement ensures the package contents are limited so that any accident consequences during transport of material in Industrial Packages are essentially the same as that associated with Type A packages. Type A packages are required to have an external radiation level of less than 100mSv/h at 1 meter from the unshielded contents.

Type A package contents limits are determined for individual radionuclides and are based on various ‘Q values’ related to exposure pathways for external photon dose, external beta dose, inhalation dose, skin and ingestion dose due to contamination transfer or submersion dose.

Specific assumptions concerning the exposure pathways used in the derivation of individual Q values are based on the following radiological criteria:

- a) The effective or committed effective dose to a person exposed in the vicinity of a transport package following an accident should not exceed a reference dose of 50mSv
- b) The dose or committed equivalent dose received by individual organs, including the skin, of a person involved in the accident should not exceed 0.5Sv, or in the special case of the eye, 0.15Sv
- c) A person is unlikely to remain at 1 meter from the damaged package for more than 30 minutes

For the higher activity material that may be associated with the proposed National Store, it is probable that the radioactive material would be transported in predominantly Type B(U) transport packages, although Type A and Type B(M) packages may be used for special circumstances. Shipments under the 'special arrangement' provisions of the *Code* may occur.

Special arrangement shipments are approved shipments where the transport packages do not conform to the exact requirements of the *Code* but are assessed by the competent authority as providing an equivalent level of safety as that required by the *Code*.

In the majority of instances, however, it is envisaged that the transport will be undertaken in Type B(U) containers. Type B(U) packages have 'unilateral' approval by the competent authority of the country of origin of the package. In issuing a Type B(U) approval the competent authority must satisfy itself that the design and test requirements specified in the *Code* have been satisfied. These typically require a transport container to pass the:

1. water spray test;
2. free drop test;
3. stacking test, and
4. penetration tests applicable to Type B(U) transport packages

For Type B and C packages transporting high activity radioactive material, the packages must undergo an enhanced water immersion test, and for packages transporting fissile material, a range of additional tests are required.

In addition to the physical design and testing requirements of Type B(U) packages described above, active safety features would enhance the overall safety of the transport. Such active safety would include such things as approval of the package design by a competent authority, and for Type B(M) packages, special arrangement shipments, and shipments containing fissile material, additional approval by the competent authority of the shipment and the transport route.

In assessing the package design, or approving of shipment and the transport route to be taken, the competent authority would need to satisfy itself that the manufacture, maintenance and use of any transport packages was within a quality system. In addition the competent authority would assess the radiation protection program and the emergency response plans and procedures associated with any proposed shipment to a National Store, and satisfy itself that workers, members of the general public and the environment are adequately protected before issuing the relevant approvals.

ATTACHMENT C

Planning for Regulatory Review of Applications for Licence for the Proposed National Radioactive Waste Repository.

ARPANSA has prepared a project plan and draft schedule to consider the applications. Under the plan:

- ARPANSA will place notices in the Gazette and *The Australian* newspaper (and possibly other newspapers), notifying that the applications have been received, outlining the procedures for making public submissions and inviting the public to make submissions on the applications. Copies of the applications will be distributed to the public, interested groups, libraries and governments.
- 2 rounds of public submissions are likely to be invited. A first round will be invited in the newspaper notice mentioned in (a). These submissions may address any issue related to the applications. A second round of submissions may be invited (by newspaper notice) to address key issues in the applications.
- The CEO of ARPANSA will also seek to conduct a public forum, subject to the agreement of the proponent and other participants. The CEO, assisted by 2 experts, will hear from the applicant and invited interested groups on issues related to the application.
- In assessing the technical aspects of the applications, the CEO will employ an international peer review (through the auspices of the IAEA) and seek advice from the Nuclear Safety Committee. At this stage, it is expected that the peer review will focus on how what is proposed in the applications compares to international best practice in radiation protection and nuclear safety and the advice from the Committee will consider discrete technical issues. ARPANSA's Regulatory and Environment and Radiation Health Branches will also provide the CEO with a Regulatory Assessment Report.
- In making his decision whether to issue a licence authorising one or more of the activities the subject of the applications (prepare a site, construct and operate) the CEO will consider the public submissions, advice and the regulatory assessment and any other relevant matters.