AUSTRALIA

(Based on 2014 Joint Convention national report)

a) National framework for management of spent fuel and radioactive waste

Australia's radioactive waste management policy requires that all radioactive waste generated within Australia be stored or disposed of in Australia at suitably sited facilities after being categorised in accordance with the national classification scheme, which is consistent with agreed international practice.

Australia's radioactive waste comes from two main sources: mining activities and the use of radionuclides in research, medicine and industry. In Australia, producers of radioactive waste are responsible for looking after the waste that they generate, and each of the Federal, State and Territory governments is responsible for regulating the radioactive waste generated within its jurisdiction. Given the small amounts of radioactive waste generated in Australia, it has proven difficult for centralised storage and disposal facilities to be established within each jurisdiction. As a result, more than 100 sites across Australia are licensed to store low and intermediate-level radioactive waste and materials on an interim basis.

Australia's first research reactor, the High Flux Australian Reactor (HIFAR), was permanently shut down in January 2007, following almost 50 years of successful operation. HIFAR has been replaced by the 20 MW Open Pool Australian Light water (OPAL) reactor, which is a multi-purpose research reactor used for neutron beam research, production of radioisotopes for medicine and industry, and irradiation of materials, such as silicon for the high-performance computer industry.

The Australian Government is committed to establishing a national facility for the appropriate long-term management of Australia's radioactive waste. The preferred option for the national facility is a co-located low-level waste (LLW) disposal and long-term intermediate-level waste (ILW) storage facility, pending the future disposal of ILW at another facility.

b) National legal and regulatory framework

The legislation current in each jurisdiction:

- establishes a regulatory body accountable to a Minister of the Crown and through that Minister to the Parliament;
- includes requirements to comply with accepted national standards for occupational exposure limits, dose limits, disposal of radioactive waste, transport of radioactive material, and air and waterborne discharge limits;
- requires reporting of incidents and exposures; and
- gives the regulatory body powers to monitor and enforce compliance with legislative requirements.

The National Directory for Radiation Protection (NDRP) contains the agreed de minimus regulatory requirements implemented in all Australian jurisdictions. The NDRP is the

principal means for addressing the inconsistencies in radiation protection regulation across the various Australian jurisdictions. The NDRP provides an overall agreed framework for radiation safety, including both ionising and non-ionising radiation, together with clear regulatory statements to be adopted by the Commonwealth Government and the States and Territories. The NDRP is developed by all regulators though the processes of the Radiation Health Committee. This Committee, established under the ARPANS Act, includes radiation regulators from each jurisdiction. Additions to the NDRP require final approval from health ministers on behalf of respective governments from each of the jurisdictions before being adopted.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Australian Government's primary authority on radiation protection and nuclear safety. ARPANSA regulates Commonwealth entities using radiation, with the objective of protecting people and the environment from the harmful effect of radiation. ARPANSA undertakes research, provides services, and promotes national uniformity and the implementation of international best practice across all jurisdictions.

c) Radioactive waste management, decommissioning and spent fuel strategy

The current inventory of intermediate level radioactive waste in Australia that is not suitable for near-surface disposal consists of a waste volume of approximately 465.6 m^3.This includes waste from the production of radiopharmaceuticals, wastes from mineral sands processing, and used sources from medical, research and industrial equipment.

Spent fuel is transported overseas, to the United States (US) in the case of US-obligated fuel that qualifies under the Foreign Research Reactor Spent Nuclear Fuel Acceptance (FRR-SNFA) take-back program, or to another country for reprocessing. Used fuel from ANSTO's former reactors has been safely shipped overseas for reprocessing or storage since 1963. Since then, ANSTO has planned and managed nine shipments, two to the UK, four to France and three to the USA. ANSTO no longer retains any used fuel from its former HIFAR and Moata reactors. The residual waste material from the reprocessing of HIFAR spent fuel sent to France was returned to Australia in December 2015. Similar material from one of the shipments to the UK will return to Australia in coming years.

In March 2015, the Government initiated a voluntary site nomination process to identify a location for Australia's national radioactive waste management facility. Following assessment of the 25 land nominations received, the Government identified six potentially suitable sites for community consultation. The outcomes of this consultation process will assist the Government in determining which sites to take forward for detailed site characterisation studies and consideration in a detailed business case.

Table 1a Radioactive Waste In Storage (including spent fuel that is considered waste)

Route Waste Class	Processed (type)/Un processed	Total Current Volume (m^3)	Estimated Disposal Volume (m^3)	Distribution (%)							Planned Disposal Route (if known)
				RO	FFE	RP	NA	DF	DC/ RE	ND	
All Classes	Partial	4510*								100	

* Unsealed radioactive waste only

NEWMDB waste origin type codes:
RO – reactor operations
FFE – fuel fabrication & enrichment
RP – fuel reprocessing
NA – nuclear applications
DF - defence
DC/RE - decommissioning & remediation
ND - Not Determined

Table 1b Uranium mining and milling waste

Jurisdiction	Volume (m^3)	Mass (Mt)
Northern Territory		43.1
South Australia	59269115	

Table 2 Radioactive Waste Disposed (as disposed volume)

Waste Class	Processed (not)	Total Volume (m^3)	Distribution (%)							Disposal Route Used
			RO	FFE	RP	NA	DF	DC/RE	ND	
All Classes	Partial	455842*							100	

* Unsealed radioactive waste only

Table 3 Spent fuel in Storage (MTHM)

Type	Current Amount (NPP)	Current Amount (Research Reactors)
Total Spent Fuel Storage		
Wet storage (AR)		
Wet storage (AFR)		
Dry storage (AR)		
Dry storage (AFR)		
Total spent fuel held in storage for other countries (amounts also included above)		

Table 4 Spent fuel sent for reprocessing (in the country or sent to another country) (MTHM)

Type	Current Amount (NPP)	Current Amount (Research Reactors)
Total amount Spent Fuel sent to		0

Reprocessing (in your country)		
Total amount Spent Fuel sent to Reprocessing (in another country)	0	0 from current OPAL reactor (2281 fuel assemblies from previous HIFAR reactor from 1963-2009).
Total amount of Spent Fuel received from another country for reprocessing and recycling		0
Total amount of Spent Fuel (MTHM) or radioactive waste (cubic metres) returned to country of origin for storage/disposal		0

Table 5 Example of a translation matrix (from NEWMDB) that can be used for transition from a national classification system to IAEA classification

National Waste Classification Name	**VLLW**	**LILW**	**ILW**	**HLW**
VLLW	100			
LLW		100		
ILW			100	
HLW				100

Table 6 Waste management facilities

Type	**Planned**	**Construct.**	**Commiss.**	**In Operation**	**Shutdown**	**Decomm.**	**Other**	**Total**
Spent Fuel Storage	0	0	0	1 (ANSTO OPAL reactor service pool – interim storage only)	0	0	3 at ANSTO previously used for interim storage of spent fuel (2 fuel ponds and 1 dry storage facility – these have been repurposed	4
Spent Fuel Reprocessing and Recycling	0	0	0	0	0	0	0	
Spent Fuel Conditioning	0	0	0	0	0	0	0	
Spent Fuel disposal	0	0	0	0	0	0	0	
Waste processing								

Waste storage				10*				
Waste disposal				1	3			

* Only includes stores subject to Joint Convention Reporting

Table 7 Summary of major sources of waste

Type	Planned	Construct	Commiss.	In Operation	Shutdown	Decomm.	Other	Total
Research reactors				1	1	1		3
Nuclear Power reactors								
Spent Fuel Reprocessing and Recycling								
Other								

Table 8 Future prospects

Type	Current amount	Estimated Current amount when prepared for disposal	Current Disposal Capacity	Total forecast at 2030	Disposal Capacity 2030	Total forecast at 2050	Disposal Capacity 2050
Spent Fuel Storage							
Wet storage (AR)	230	-	-	223^	-	187^	-
Wet storage (AFR)	0	0	0	0	0	0	0
Dry storage (AR)	0	0	0	0	0	0	0
Dry storage (AFR)	0	0	0	0	0	0	0
Total amount Spent fuel sent to Reprocessing and Recycling	0 from current OPAL Reactor. 2281 fuel assemblies from previous HIFAR	-	-	384 fuel assemblies sent for reprocessing (from 2016-2030)^	-	576 fuel assemblies sent for reprocessing (from 2030-2050)^	-

	reactor from (1963-2009)						
Total amount Spent fuel disposed	0	0	0	0	0	0	0
Waste in storage	4510 m^{3*} (~4050 m^3 low-level and ~550 m^3 intermediate-level	Low level waste - ~4050 m^3**	0***	-***	-***	-***	-***
Waste disposal	455842 m^{3*}	-	0***	-***	-***	-***	-***

^ Shipments of ~192 fuel assemblies every 7 years.

*Unsealed radioactive waste only.

** The low-level conditioned waste volume is expected to be similar to the unconditioned volume. Intermediate-level waste volumes will increase when the waste is conditioned for transport/disposal.

*** Existing disposal sites are closed. All wastes that are currently stored are to be disposed to a future centralised national waste management facility. The facility is yet to be established and forecast capacity from 2030-2050 is not currently available.