

Chronology
No. 1 2003–04

Radioactive Waste and Spent Nuclear Fuel Management in Australia

This chronology outlines the history of radioactive waste management in Australia. It documents the drawn-out policy processes associated with the management of Australia's small amount of radioactive waste material. It also outlines some of the key stages in the process of replacing Australia's only nuclear reactor—the research reactor at Lucas Heights near Sydney. This chronology does not address the history of wastes associated with uranium mining.

Dr Ian Holland
Politics and Public Administration Group
18 August 2003

ISSN 1442-1992

© Copyright Commonwealth of Australia 2003

Except to the extent of the uses permitted under the *Copyright Act 1968*, no part of this publication may be reproduced or transmitted in any form or by any means including information storage and retrieval systems, without the prior written consent of the Department of the Parliamentary Library, other than by Senators and Members of the Australian Parliament in the course of their official duties.

This paper has been prepared for general distribution to Senators and Members of the Australian Parliament. While great care is taken to ensure that the paper is accurate and balanced, the paper is written using information publicly available at the time of production. The views expressed are those of the author and should not be attributed to the Information and Research Services (IRS). Advice on legislation or legal policy issues contained in this paper is provided for use in parliamentary debate and for related parliamentary purposes. This paper is not professional legal opinion. Readers are reminded that the paper is not an official parliamentary or Australian government document. IRS staff are available to discuss the paper's contents with Senators and Members and their staff but not with members of the public.

Acknowledgements

The author thanks Cathy Madden, Deirdre McKeown, Patrick O'Neill, Rod Panter, John Prytz, Sudip Sen, June Verrier and Janet Wilson for their assistance. The author also thanks officers of the Department of Education, Science and Training, the Australian Radiation Protection and Nuclear Safety Agency, and the Australian Nuclear Science and Technology Organisation for their assistance. Thanks also to the St George and Sutherland Leader newspaper for providing an article from their archives, and officials from several State agencies who answered questions on various factual details.

Enquiries

Information and Research Services publications are available on the ParlInfo database.

On the Internet the Department of the Parliamentary Library can be found at:

<http://www.aph.gov.au/library/>

IRS Publications Office

Telephone: (02) 6277 2778

Published by the Information and Research Services, Department of the Parliamentary Library, 2003.

Contents

List of Acronyms

Introduction 1

Chronology 6

Further information online 39

Further reading. 39

List of Acronyms

AAEC	Australian Atomic Energy Commission
ADI	Australian Defence Industries
ANSTO	Australian Nuclear Science and Technology Organisation
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASSESS	a system for selecting suitable sites
ASTEC	Australian Science and Technology Council
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CXRL	Commonwealth X-ray and Radium Laboratory
DPIE	Department of Primary Industries and Energy
HIFAR	high flux Australian reactor
NHMRC	National Health and Medical Research Council
NRIC	National Resource Information Centre

Introduction

Australia has had a long involvement in nuclear science and technology, despite not developing either a domestic nuclear power industry or a nuclear weapons capability. Although Australia came close to doing both these things in the late 1960s, the country's main roles have been as:

- a user of ionising radiation and nuclear technologies in applications in medicine, research and industry from the end of the 19th century until the present day
- a long-standing player in nuclear research, hosting one of the world's first nuclear research reactors
- a test site for British nuclear weapons tests, and
- a supplier of uranium to the world.

Ionising radiation is in common use in society today in medical, research, industrial and domestic application. Examples include the radioisotopes that are used in nuclear medicine (diagnosis, therapy), industry (process controls, a variety of gauges, non-destructive testing), research (environmental tracers) and homes (smoke detectors). As a result of its engagement with ionising radiation, Australia has been host to a number of radioactive waste management challenges.

Australia has total holdings of around 4 300 cubic metres of radioactive waste. Australia's radioactive waste stockpile is dwarfed by that of most other developed countries. Canada, for example, has total holdings of more than 1.8 million cubic metres of low level waste alone. Details of Australia's holdings of radioactive waste and expected future production were given in the Department of Industry, Science and Resources' *National Radioactive Waste Repository Site Selection Study—A Report on Public Comment* in 1999, and are reproduced in Tables 1 and 2, below.

The pattern that emerges from the history of Australia's radioactive waste management is one of:

- little attention to the management of radioactive waste until the 1970s (as was the case in most countries around the world)
- very drawn-out policy processes since the 1970s for resolving radioactive waste issues
- (since the 1970s) sensitivities in the community causing significant difficulties for all governments in resolving radioactive waste management issues

- in-principle cooperation between the Commonwealth and the states and territories, but tensions between them whenever the Commonwealth has approached the issue of specific proposals to locate radioactive waste facilities in their jurisdiction, and
- despite some efforts, an inability of the Commonwealth to respond successfully to calls to resolve nuclear waste issues as a precondition to the further development of nuclear industries.

Community concerns about the siting of national radioactive waste facilities have been partly related (for at least the last ten years) to opposition to the replacement research reactor at Lucas Heights. That component is likely to continue to be a significant driving force in the debate on radioactive waste management facilities, at least until the CEO of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) issues the operating licence for the reactor. This is because, if the establishment processes for radioactive waste management facilities have not advanced to his satisfaction, the CEO made it clear in August 2000 that he will not issue the licence.

In its experience with nuclear waste management, Australia differs little from most countries that have nuclear programs. The most distinctive feature is that Australia has found it difficult to resolve its waste issues despite the tiny amount of material actually involved. Australia's minor radioactive waste stockpile continues to cast a very long shadow.

This chronology outlines the history of radioactive waste management in Australia. Australia has neither commercial nor military nuclear programs, but its long involvement with nuclear science, nuclear weapons tests and uranium mining has left a legacy of radioactive waste, the management of which has proven a tough policy nut to crack.

This chronology outlines the history of three main strands of activity. They are the management of:

- radioactive medical, scientific and industrial waste, particularly through attempts to create waste repositories for relatively low-level wastes presently housed at dozens of sites around the country
- spent nuclear fuel from Australia's research reactor at Lucas Heights near Sydney, and
- site contamination from British nuclear weapon's tests conducted in South Australia in the 1950s.

This chronology does not address the history of wastes associated with uranium mining.

There are different ways of classifying radioactive waste. Australian debate about waste management has focussed on classifying wastes according to their treatment pathways and

final management options. From this perspective, radioactive wastes are referred to as low, intermediate or high level wastes.

Low level wastes are those with minor levels of contamination by radioactive substances, such as laboratory waste, and other materials that might have come into contact with radiation sources. Special shielding is not normally required for transport and handling. The levels of radiation are sufficiently low that shallow burial in containers is generally regarded as a safe method of disposal.

Intermediate level wastes are those emitting higher levels of radiation. In turn, they are broken up into short-lived and long-lived intermediate level wastes. Short-lived intermediate level wastes are items that might be more radioactive than most low level materials, but the radiation is caused by radioisotopes that decay quickly. If they are stored or buried for relatively short periods (meaning decades or a few centuries), then their radiation levels drop to a point where they no longer present any risk. Long-lived intermediate level wastes will be radioactive in the long-term. These wastes sometimes require shielding during handling and transport. They include by-products from the treatment of spent nuclear fuel, some wastes produced by the operation of nuclear reactors, and some long-lived radiation sources used in industrial applications. These wastes are not suited to shallow burial, and in Australia the preferred approach is long-term above-ground storage, pending eventual disposal in a geological repository. Australia currently has not, however, commenced planning for such a repository. Spent fuel rods from the High Flux Australian Reactor (HIFAR) research reactor are being reprocessed overseas, and the resulting wastes will be long-lived intermediate level wastes. When they return to Australia, these wastes can be managed along with other holdings of this class of waste.

High level wastes arise as by-products from the reprocessing of spent nuclear power reactor fuels, and emit high levels of radiation and significant quantities of heat. Still controversial, the only disposal option considered for such waste is deep, permanent geological disposal. Australia does not generate high level wastes.

Table 1

Main sources and estimated volumes of low level and short-lived intermediate level wastes to be accepted at the national near-surface repository

Source	Type	Estimated volume (cubic metres)	Estimated annual generation rate (cubic metres)
ANSTO—current	Low level solid waste including compacted contaminated clothing, paper and glassware	1080	30 This generation is expected to continue after replacement of HIFAR with the replacement reactor
ANSTO—HIFAR Decommissioning wastes	Based on 30 years care and maintenance then entombment in the year 2035	500	nil
ANSTO—Replacement research reactor decommissioning wastes	Dependent on reactor type and operational arrangements	Less than HIFAR	nil
States / territories	Industrial gauges, exit signs, smoke detectors, medical sources	100	5–10
Defence	Electron tubes, radium painted watches, compasses, sealed sources	60	<5
CSIRO	Contaminated soil from CSIRO research into treatment of radioactive ores 30–40 years ago	1950	nil

Source: *National Radioactive Waste Repository Site Selection Study—A Report on Public Comment*, Department of Industry, Science and Resources, June 1999, page 47.

Table 2

Estimated volumes of waste forms to be accepted at a long-lived intermediate level waste store

Source	Type	Estimated volume of waste form (cubic metres)	Estimated annual generation rate (cubic metres)
ANSTO— Radioisotope Production	(a) Solid waste (b) Solid waste from production	205 0.7	1.5 0.03
ANSTO—HIFAR spent fuel reprocessing waste until reactor closure	(a) Wastes in glass matrix from Cogema (b) Cemented wastes from Dounreay	3 20	nil nil
ANSTO—HIFAR decommissioning wastes	Based on 30 years care and maintenance then entombment	5	nil
ANSTO— Replacement Research Reactor (depends on reactor design and operational factors)	(a) Operational wastes (b) Spent fuel reprocessing waste	nil	2 nil Similar generation rate as HIFAR— radiopharmaceutical production possibly increased by a factor of four
	(c) Eventual decommissioning	Less than HIFAR	nil
Historical waste from Australian industry held by ANSTO	Thorium and Uranium residues from mineral sands processing	165	nil
States / territories	Mainly sealed sources including americium- 241, radium-226, caesium-137	100	2
Other Commonwealth	Sealed sources— americium-241 and radium-226	35	1

Source: *National Radioactive Waste Repository Site Selection Study—A Report on Public Comment*, Department of Industry, Science and Resources, June 1999, page 48.

Chronology

Milestones	Details	Source Documents
1895 and 1896, and into the 20 th century	<p>X-rays (1895) and radioactivity (1896) are discovered. Shortly afterwards, x-rays and radioactivity are being used in research in Australian universities.</p> <p>Australian physicians commenced using x-rays for clinical purposes in 1896. The technology spread very rapidly (it was in use, for example, in Albury and in Wilcannia during 1896).</p> <p>Radioactivity entered into clinical use overseas around 1901. Its first use in Australia was in Melbourne, in 1903. It was used widely for treating tumours and for also for dermatology. It had the advantage of being able to be introduced into the body in needles or tubes for local irradiation of tumours. Radiation from radium was at consistent rates and was much more reliable than x-rays from the primitive equipment of the time.</p> <p>Medical evidence emerged by the early years of the 20th century that exposures to x-rays and radioactivity could cause deleterious health effects. Nevertheless, the medical successes of radiation caused strong popular belief in the benefits for good health of radiation and, in particular, radioactivity. Products such as radium water and radium soap were promoted and used as remedies for a wide range of medical conditions.</p> <p>Radium also had industrial, military and domestic uses. Until around 1960, for example, it was used widely in the form of luminous paint, which was applied to watches and clocks, scientific instruments, dials in instrument panels, and so on.</p> <p>X-rays also came into wider use in society, although the main use was in medicine. For example, by the 1950s, shoe shops in Australia commonly confirmed the fit of shoes (children's, especially) with equipment that used x-rays to show an image of the feet in the shoes.</p>	<p><i>Australian Encyclopaedia</i>, 1965 edition, Grolier Society of Australia, Sydney, vol. 7, pp. 354–5.</p> <p>'The X Rays and cancer. A local case. An appeal to the charitable', <i>Albury Daily News</i>, 15 October 1896.</p> <p>Hugh Hammersley, 'Radiation Science and Australian Medicine, 1896–1914', <i>Historical Records of Australian Science</i>, vol. 5, no. 3, 1982, pp. 41–63.</p>

Milestones	Details	Source Documents
1929	<p>The Commonwealth Government establishes the Commonwealth Radium Laboratory, which in 1935 becomes the Commonwealth X-ray and Radium Laboratory (CXRL). The Laboratory is set up to safeguard radium purchased by the Government and to distribute it to treatment centres in the capital cities (the Commonwealth had purchased 10 grams of radium at a cost of £100 000). The Laboratory is located at the University of Melbourne, and is controlled and staffed by the Commonwealth's Department of Health.</p>	<p>National Archives of Australia, Agency Notes for agency CA 2466; Agency Notes for agency CA 2467.</p>
1946	<p>The Commonwealth passes the <i>Atomic Energy (Control of Materials) Act 1946</i>. The Act is motivated by defence concerns in the wake of the creation of nuclear weapons at the end of World War II. It establishes an Atomic Energy Advisory Committee to assist the minister to deal with nuclear issues. It also asserts Commonwealth ownership and control of the minerals from which elements such as uranium, thorium and plutonium may be derived (sections 3, 6).</p>	<p><i>Atomic Energy (Control of Materials) Act 1946</i></p>
1946	<p>Australia begins protracted negotiations and deals with Britain and the United States, seeking access to scientific and technological information to support the development of industrial atomic energy. Discussions tend to involve talk of a trade: Australian uranium in exchange for American or British expertise and technology. Many, such as South Australian Premier Tom Playford, believe nuclear power is vital to future development and just years away from being realised in Australia.</p>	<p>Alice Cawte, <i>Atomic Australia</i>, University of New South Wales Press, 1992.</p>
1950s	<p>During the 1950s the States began to introduce radiation protection legislation.</p> <p>By the 1950s, a range of radioactive waste had accumulated which include used x-ray tubes, used thermionic valves (e.g. radio valves), radioactive sources (many of which utilised radium) and radium-painted faces and hands from scientific, vehicular (including aeroplane) and domestic instruments. CXRL instituted a collection program for such materials. The materials that were collected were stored at the Department of Supply's site at Maribyrnong, Victoria.</p>	<p>Acts included <i>Radioactive Substances Act 1957</i> (NSW); <i>Health Act 1935</i> (SA); <i>Radioactive Substances Act 1954</i> (WA).</p>

Milestones	Details	Source Documents
1952 to 1957	The British conduct a series of nuclear weapon tests at the Monte Bello Islands off Western Australia, and at Maralinga and Emu in South Australia, which result in significant radioactive site contamination. The British subsequently make attempts to clean up Maralinga and Emu between 1963 and 1967; these are not successful.	Maralinga Rehabilitation Technical Advisory Committee, Rehabilitation of Former Nuclear Test Sites at Emu and Maralinga (Australia) 2003 , Department of Education, Science and Training, 2002, pp. 8–12.
c. 1953	The government accepts scientific advice from its Atomic Energy Advisory Committee 'to embark upon a research and development programme leading to the industrial use of atomic energy'. This includes seeking to construct an experimental reactor in Australia.	<i>House of Representatives Debates</i> , 19 March 1953, p. 1391.
April 1953	The <i>Atomic Energy Act 1953</i> comes into effect. The Act incorporates the powers of ownership and control previously in the <i>Atomic Energy (Control of Materials) Act 1946</i> . Most importantly, it creates the Australian Atomic Energy Commission (AAEC). The Commission is empowered to be involved in all stages of the nuclear cycle, including 'to sell or otherwise dispose of materials or energy produced as a result of the operations of the Commission' (subsection 17(1)(f)).	Atomic Energy Act 1953 (current version: sections pertaining to the AAEC were repealed by the Atomic Energy Amendment Act 1987). Ann Moyal, 'The Australian Atomic Energy Commission: A Case Study in Australian Science and Government', <i>Search</i> , vol. 6, no. 9, 1975, pp. 365–84.
November 1955	Construction of the <u>H</u> igh <u>F</u> lux <u>A</u> ustralian <u>R</u> eactor (HIFAR) commences at Lucas Heights, in Sutherland Shire in Sydney's south-west.	Australian Nuclear Science and Technology Organisation, A Brief History 1948–1995 .
26 January 1958	The AAEC's High Flux Australian Reactor (HIFAR) achieves criticality. The reactor is officially opened by Prime Minister Robert Menzies on 18 April 1958.	Australian Nuclear Science and Technology Organisation, A Brief History 1948–1995 .
April 1961	The AAEC's small MOATA research reactor, comes into operation at Lucas Heights.	Australian Nuclear Science and Technology Organisation, A Brief History 1948–1995 .

Milestones	Details	Source Documents
1963	Repatriation to the United Kingdom of the first spent nuclear fuel rods from the HIFAR reactor.	Australian Atomic Energy Commission, <i>Eleventh Annual Report</i> , 1962–63, p. 61.
1960s	The AAEC commences using the HIFAR reactor to produce radioisotopes for use in the emerging discipline of nuclear medicine.	
February 1969	Prime Minister John Gorton indicates the government's intention to introduce nuclear power in Australia. It is an idea that has been examined by the AAEC at least since 1965, and late in 1969, the AAEC completes a feasibility study and recommends construction of a power plant at Jervis Bay. Gorton publicly endorses the proposal. The rationale for the scheme is as much military as industrial: the AAEC's preferred option is for a plant that could generate weapons-grade plutonium. The only awareness of nuclear waste issues appears to be minor concern about wastes in the event of a nuclear accident.	Alice Cawte, <i>Atomic Australia</i> , University of New South Wales Press, 1992, pp. 121, 124, 128. 'Gorton gave nod to nuclear power plant' , <i>The Age</i> , 1 January 2000. 'Classic stoush the sub-text to nuclear plan' , <i>Canberra Times</i> , 1 January 2000.
June 1971	Gorton's Prime Ministerial successor Billy McMahon opposes an Australian nuclear power program, and plans for an Australian nuclear power industry are deferred indefinitely.	'Gorton gave nod to nuclear power plant' , <i>The Age</i> , 1 January 2000.
Circa 1972	The Department of Supply transfers the wastes collected by CXRL, and some Commonwealth wastes, to the Department's site at St Mary's, NSW.	
1973	Australia signs (1970) and ratifies (1973) the Nuclear Non-Proliferation Treaty and thereby rules out a nuclear weapons program.	Alice Cawte, <i>Atomic Australia</i> , University of New South Wales Press, 1992, p. 129. Nuclear Non-Proliferation Treaty
1972–73	In 1972 the Commonwealth X-ray and Radium Laboratory is renamed the Commonwealth Radiation Laboratory, and in 1973 is renamed the Australian Radiation Laboratory. It continues to function as an element of the Department of Health. It acquires responsibility for studies of radioactive fall-out from the Department of Science.	National Archives of Australia, Agency Notes for agency CA 2468 .

Milestones	Details	Source Documents
1978	<p>During a meeting of Commonwealth, State and Territory Health Ministers, the State and Territory Ministers ask the Commonwealth to co-ordinate a national approach to the management of radioactive waste and the development of relevant codes of practice. The Commonwealth considers the request and agrees to take on that role.</p> <p>The development of the NHMRC's 'Radiation Health Series' of codes of practice for the management of wastes arising from the medical, research and industrial use of radionuclides arose from this initiative, as did the search for a national repository site for low and short-lived intermediate level radioactive wastes.</p>	<p>'Cabinet to decide on N-waste', <i>The Age</i>, 10 February 1978.</p> <p>'National dump to take all nuclear waste', <i>The Australian</i>, 28 June 1978.</p>
1978	<p>The NSW Government prepares to clean up a former industrial site in Hunters Hill, Sydney, which is contaminated with radioactive thorium and radium. However, proposals to dump the contaminated soil at a disused mine in the State's far west are abandoned following a lobbying campaign.</p>	<p>Rod Panter, 'Radioactive Waste Disposal in Australia', <i>Issue Paper no. 6</i>, Department of the Parliamentary Library, 1992.</p> <p>'Radiation danger in streets', <i>The Age</i>, 20 November 1978.</p>
1978	<p>The AAEC and the Australian National University commence a joint venture to develop synroc (synthetic rock) as a possible containment material for high-level radioactive waste.</p>	
1980	<p>A Commonwealth–State Consultative Committee on Radioactive Waste Management is established.</p>	

Milestones	Details	Source Documents
November 1983	<p>The Commonwealth Government asks Chairman of the Australian Science and Technology Council (ASTEC), Professor Ralph Slatyer, to prepare a report on Australia's role in the nuclear fuel cycle. It has been argued that the purpose of the report was to give the Hawke Government some independent advice to support a shift in ALP policy to a more liberal position on the mining and export of uranium.</p> <p>The ASTEC report, released in May 1984:</p> <ul style="list-style-type: none"> • supports identification of 'sites suitable for disposal of low level radioactive waste and ... the development of facilities for interim storage and disposal of low and intermediate level radioactive waste' (p. 23) • argues Australia should participate in the international research effort on the disposal of high level waste, and • endorses continuing research into synroc. 	<p>ASTEC, <i>Australia's Role in the Nuclear Fuel Cycle</i>, AGPS, Canberra, May 1984.</p>
16 July 1984	<p>The Commonwealth Government establishes the Royal Commission into British Nuclear Tests in Australia, chaired by Justice McClelland (also known as the Maralinga Royal Commission). The future management and use of the test sites was only one matter the Commission investigated, but it became one of the most prominent, with test site contamination becoming a major focus of both the Commission's report and the government's response.</p>	<p>Royal Commission into British Nuclear Tests in Australia, <i>Report</i>, AGPS, Canberra, 1985.</p>
1985	<p>Following a fire in 1983 near an office basement being used to store radioactive waste, the Victorian Government selects a site for a storage site in country Victoria. As in NSW in 1978, a range of interests combined to lobby against, and ultimately defeat the proposal.</p>	<p>Rod Panter, 'Radioactive Waste Disposal in Australia', <i>Issue Paper no. 6</i>, Department of the Parliamentary Library, 1992.</p> <p>'A radioactive waste facility—Melbourne style', <i>The Herald (Melbourne)</i>, 29 December 1985.</p>

Milestones	Details	Source Documents
1985	<p>The Commonwealth–State Consultative Committee on Radioactive Waste Management recommends that a 'national program be initiated to identify potentially suitable sites for a national near-surface radioactive waste repository'. State and Territory governments commence studies to identify potentially suitable sites in their jurisdictions.</p> <p>The NHMRC issues the <i>Code of Practice for the Disposal of Radioactive Wastes by the User</i>.</p>	<p>Department of Primary Industries and Energy, National Radioactive Waste Repository Site Selection Study. Phase 2, Report on Public Comment, AGPS, Canberra, 1995.</p> <p>ARPANSA, Code of Practice for the Disposal of Radioactive Wastes by the User, 1985</p>
November 1985	<p>The Minister for Resources and Energy (Senator Evans) introduces into Parliament Bills to overhaul the Atomic Energy Act and replace the Atomic Energy Commission with the Australian Nuclear Science and Technology Organisation (ANSTO). The Bills pass and come into effect in 1987 (see below).</p>	<p>Senate Debates, 6 November 1985, p. 1618.</p>
1986	<p>The studies conducted by states and territories under the Commonwealth–State Consultative Committee indicate that most states and the Northern Territory contained potentially suitable locations for a repository.</p>	<p>Bureau of Resource Sciences, <i>A Radioactive Waste Repository for Australia: Site Selection Study – Phase 3 Regional Assessment</i>, Bureau of Resource Sciences, Canberra, 1997, p. 2.</p>
20 June 1986	<p>As part of the process of creating ANSTO, a review of the Atomic Energy Commission is commissioned to advise on 'whether the current objectives, programs, organisation and staffing of the AAEC appear appropriate for ANSTO', and if not, to 'recommend measures for achieving changes'.</p>	<p>Committee of Review of the Australian Atomic Energy Commission, <i>Report of the Review</i>, October 1986.</p>
September 1986	<p>The Commonwealth Government accepts most of the recommendations of the Royal Commission into British Nuclear tests in Australia. It establishes technical and consultative committees to commence planning for a clean-up operation.</p>	<p><i>Senate Debates</i>, 17 September 1986, p. 498.</p> <p><i>Government Response to the Recommendations of the Royal Commission into British Nuclear Tests in Australia</i>, Parliamentary Paper no. 678/1986.</p>

Milestones	Details	Source Documents
October 1986	<p>The Committee of Review of the Australian Atomic Energy Commission delivers its report. It recommends ANSTO be more outward-looking, set clearer objectives and work on succession planning amongst its scientific staff. It also identifies sudden changes by governments to programs as a source of problems in the past.</p>	<p>Committee of Review of the Australian Atomic Energy Commission, <i>Report of the Review</i>, October 1986.</p>
April 1987	<p>The <i>Australian Nuclear Science and Technology Organisation Act 1987</i> takes effect, replacing the AAEC with a new statutory body, ANSTO. The functions of ANSTO are set out in section 5 of the Act.</p> <p>The new Act requires:</p> <ul style="list-style-type: none"> • the formation of a Nuclear Safety Bureau within ANSTO, to be appointed by ANSTO's Board, and responsible to the Minister 'for monitoring and reviewing the safety of any nuclear plant operated by the Organisation' (section 25), and • the establishment by the Minister of a Safety Review Committee to 'review and assess the effectiveness of the standards, practices and procedures adopted by the Organisation to ensure the safety of its operations'; the Committee's annual report is to be tabled in Parliament (Section 26). 	<p><u>Australian Nuclear Science and Technology Organisation Act 1987</u></p>
1988	<p>The Northern Territory agrees to a Commonwealth-funded feasibility study of a possible national waste repository to be located in the Territory. The study is completed in 1989.</p>	<p>Bureau of Resource Sciences, <i>A Radioactive Waste Repository for Australia: Site Selection Study—Phase 3 Regional Assessment</i>, Bureau of Resource Sciences, Canberra, 1997, p. 2.</p>
Late 1988	<p>A short time before the shipping date, the US Department of Energy halts arrangements with ANSTO for the repatriation of 114 spent nuclear fuel rods, pending the preparation of an environmental impact statement by the Department on the return of spent fuel from research reactors around the world.</p>	<p>'Greenies block nuke proposal', <i>Daily Telegraph</i>, 25 February 1989.</p>

Milestones	Details	Source Documents
April 1989	Defence contractors discover radioactive contamination of soil at a CSIRO chemical research facility at Fishermens Bend in Victoria. Between the mid-1940s and the mid-1960s, scientists at the facility had undertaken research to develop chemical processes to extract uranium from Australian ores.	'On the road again: radioactive soil heads to Woomera', <i>Sydney Morning Herald</i> , 8 December 1994.
December 1989	In early 1989, the Queensland National Party government builds a temporary radioactive waste storage facility at Redbank in southeast Queensland for the State's waste material. In December, following the election of a new ALP government, the facility is closed without ever being used.	'A damp dawn on the picket line', <i>Courier-Mail</i> , 17 May 1989; 'State's "hot" waste plan "temporary"', <i>Courier-Mail</i> , 27 May 1989; 'Redbank toxic waste dump opened, then closed', <i>Courier-Mail</i> , 13 December 1989.
1990	The CSIRO contaminated soil is moved to ANSTO's Lucas Heights facility in around 10 000 44-gallon drums.	Technical Assessment Group, <i>Rehabilitation of Former Nuclear Test Sites in Australia</i> , Department of Primary Industries and Energy, Canberra, 1990.
November 1990	The Technical Assessment Group, established by the Government in 1986 after the Maralinga Royal Commission, delivers its report on the <i>Rehabilitation of Former Nuclear Test Sites in Australia</i> . It represents the completion of extensive preliminary studies, resulting in the setting out of a range of rehabilitation options.	Technical Assessment Group, <i>Rehabilitation of Former Nuclear Test Sites in Australia</i> , Department of Primary Industries and Energy, Canberra, 1990.
April 1991	The Minister for Science and Technology (Mr Crean) meets with a delegation from Sutherland Shire Council over concerns about the management of radioactive waste on the Lucas Heights site. The Minister asks the Australian Radiation Laboratory's Safety Review Committee to undertake a review of ANSTO's management of radioactive waste at the site.	Safety Review Committee, <i>Management of Radioactive Waste at Lucas Heights Research Laboratories</i> , AGPS, Canberra, August 1991.
May 1991	The Northern Territory indicates it is no longer willing to host a repository under the Commonwealth-State cooperative process.	Bureau of Resource Sciences, <i>A Radioactive Waste Repository for Australia: Site Selection Study – Phase 3 Regional Assessment</i> , Bureau of Resource Sciences, Canberra, 1997, p. 2.

Milestones	Details	Source Documents
July 1991	ANSTO enters into a contract with Australian Defence Industries (ADI) to condition and store radioactive waste from the ADI site at St Marys. Sutherland Shire Council responds by launching a court action against ANSTO.	Senate Select Committee on the Dangers of Radioactive Waste, <i>No Time to Waste</i> , 1996, p. 3.
August 1991	<p>The Minister for Science and Technology (Mr Free) tables in Parliament the report of the Safety Review Committee, commissioned in April. The report concludes that ANSTO's waste management practices are sound and safe, but makes veiled criticism of progress on developing national waste facilities, urging that:</p> <p style="padding-left: 40px;">the Commonwealth, State and Territory Governments begin the process by identifying specific objectives and target dates for appropriate low and medium level radioactive waste repositories and that they allocate sufficient priority and resources to achieve those objectives and targets.</p>	Safety Review Committee, <i>Management of Radioactive Waste at Lucas Heights Research Laboratories</i> , AGPS, Canberra, August 1991, p. ix.
September 1991	Primary Industries Minister Simon Crean officially seeks the participation of all governments in a coordinated search for a site for a single national radioactive waste facility. All states and territories except Western Australia agree to participate.	
1992	Western Australia constructs the Mount Walton East Intractable Waste Disposal Facility, for the disposal of low level radioactive waste and other intractable wastes. Community interests in the Goldfields region opposed the facility. The availability of the site underpins Western Australia's subsequent resistance to involvement in the search for a national waste repository site.	'Mt Walton for WA waste only', <i>The West Australian</i> , 20 June 1992.
5 February 1992	The Sutherland Shire's court action against ANSTO, launched in July 1991, is successful. The NSW Land and Environment Court finds that ANSTO's functions under the ANSTO Act do not extend to the storage of radioactive waste belonging to other entities, and orders that ANSTO must not bring the waste from St Marys to its Lucas Heights site, and that CSIRO's contaminated soil, already brought to Lucas Heights, must be removed within three years.	<i>Council Of The Shire Of Sutherland v. Australian Nuclear Science & Technology Organisation</i> , Land and Environment Court of New South Wales, Decision of 5 February 1992, Unreported, Case no. 40215/91.

Milestones	Details	Source Documents
30 June 1992	<p>The <i>ANSTO Amendment Act 1992</i> takes effect, giving ANSTO immunity from legal action under state and territory laws relating to the use, proposed use or environmental consequences of land or premises, radioactive materials or dangerous goods, or licensing related to certain activities. The changes are designed to avoid a repeat of the Sutherland Shire Council court case.</p> <p>The amendments also give ANSTO the statutory functions of conditioning, managing and storing radioactive materials and radioactive waste from its own activities and those of related parties. A regulation is required if ANSTO is to provide those services to third parties, but any such regulation must not have the effect of authorising the premises on which the Lucas Heights Research Laboratories are situated to become a national nuclear waste repository.</p> <p>The amendments also establish the Nuclear Safety Bureau as a body corporate with functions that included monitoring and reviewing the safety of any nuclear plant owned or operated by ANSTO, and providing technical advice to the Commonwealth on the safety of nuclear plant and related matters.</p>	<p>Australian Nuclear Science and Technology Organisation Amendment Act 1992</p> <p>Australian Nuclear Science and Technology Organisation Amendment Bill, <i>Bills Digest</i>, 2 April 1992, Department of the Parliamentary Library, 1992.</p>
30 September 1992	<p>The Commonwealth establishes the Research Reactor Review. The three members of the review panel are asked to report on the possible replacement of the ageing HIFAR reactor at Lucas Heights.</p>	<p>'Lucas Heights review starts next month', <i>Canberra Times</i>, 1 October 1992.</p>

Milestones	Details	Source Documents
7 October 1992	<p>The Commonwealth releases its report <i>National Radioactive Waste Repository Site Selection Study, Phase 1</i> for public comment by December 1992. The Phase 1 report is prepared by the National Resource Information Centre (NRIC), a science unit within the Department of Primary Industries and Energy (DPIE). The report:</p> <ul style="list-style-type: none"> • describes the nature of radioactive wastes • briefly describes the criteria for assessing the suitability of sites for hosting a waste repository • outlines a Geographic Information System-based system for applying the criteria, and • describes the way a repository would be constructed. 	NRIC, <i>A Radioactive Waste Repository for Australia: Methods for Choosing the Right Site</i> , DPIE, Canberra, 1992.
November 1992	<p>The National Health and Medical Research Council approves a <i>Code of practice for the near-surface disposal of radioactive waste in Australia</i>.</p>	NHMRC, <i>Code of practice for the near-surface disposal of radioactive waste in Australia</i> , Radiation Health Series no. 35, AGPS, Canberra.
December 1992	<p>A consultant's report into the future economic development of the Mt Isa region in Queensland suggests establishment of a nuclear waste facility as one possible option. The proposal draws the support of the town's mayor, contributing to a decision to include the Mt Isa region in more detailed analyses by the Commonwealth of potentially suitable sites for a national nuclear waste repository.</p>	'Mt Isa will take Sydney A-waste', <i>Sun-Herald</i> , 13 December 1992.
June 1993	<p>After two years of negotiations, the British Government makes an offer of £20 million (approximately \$50 million) to Australia to assist in funding the clean up of the Maralinga and Emu nuclear test sites. The clean-up is anticipated to cost twice that amount.</p>	'Cabinet agrees to UK offer on Maralinga', <i>Canberra Times</i> , 30 June 1993; 'Nuclear waste clean-up', <i>Herald Sun</i> , 28 April 1996.

Milestones	Details	Source Documents
August 1993	<p>The report of the Research Reactor Review examines, among many other things, the issue of the management of spent fuel rods from the HIFAR reactor, which had been accumulating at Lucas Heights since 1963. The Report says:</p> <ul style="list-style-type: none">• 'a solution to this problem is essential well prior to any future decision about a new reactor', and• 'The spent fuel rods at Lucas Heights can only sensibly be treated as high level waste ... The pretence that spent fuel rods constitute an asset must stop' (p. 216). <p>The report states that 'it would be utterly wrong to decide on a new reactor before progress is made on the identification of a high level waste repository site' (p. xiv).</p>	Research Reactor Review, <i>Future Reactions: Report of the Research Reactor Review</i> , 1993.
August 1993	<p>The Commonwealth releases its <i>Report on Public Comment</i> on Phase 1 of the site selection process for a low level waste repository.</p>	DPIE, <u>National Radioactive Waste Repository Site Selection Study, Phase 1, Report on Public Comment</u> , AGPS, Canberra, 1993.

Milestones	Details	Source Documents
9 November 1993	<p>The Minister for Science and Small Business (Senator Schacht) announces decisions on a number of nuclear issues, including:</p> <ul style="list-style-type: none"> • 'The Government broadly accepts the findings of the Research Reactor Review'. • The Nuclear Safety Bureau is to be amalgamated with the Australian Radiation Laboratory 'to form a new Australian Institute for Radiation Protection'. The new body is to have regulatory and licensing powers in respect of the Commonwealth's nuclear and radiation activities, and report to the Minister for Health. Subsequently, administrative responsibility for the Nuclear Safety Bureau is transferred to the Minister for Health. However, the proposed Institute had not been established when the Labor Government lost office in 1996. • An inter-agency committee will be established 'to examine and report on matters related to the disposal of the spent fuel rods from HIFAR'. 	<p>'Government resolves nuclear issues', <i>Media Release</i>, 9 November 1993.</p>
Mid-1994	<p>A regulation is made to enable ANSTO to condition intermediate level radioactive waste at ADI's site at St Marys. Following the recommendation of a Senate inquiry, the regulation is replaced with a regulation which contained a sunset clause.</p>	<p>Australian Nuclear Science and Technology Organisation Regulations, No. 259 of 1994 and No. 415 of 1994. <i>Senate Debates</i>, 11 October 1994, pp. 1431–44.</p>
1 July 1994	<p>Responsibility for the Nuclear Safety Bureau is transferred to the Minister for Health and Family Services. The change separates the lines of accountability for ANSTO and for monitoring the safety of ANSTO's Lucas Heights operations.</p>	<p>Nuclear Safety Bureau, Annual Report 1995–96, p. 4.</p>

Milestones	Details	Source Documents
18 July 1994	<p>The Commonwealth releases its report <i>National Radioactive Waste Repository Site Selection Study, Phase 2</i> for public comment by September 1994. The Phase 2 report:</p> <ul style="list-style-type: none"> • describes the revised GIS-based model for assessing sites (now called ASSESS: A system for selecting suitable sites) • applies the model to a data set covering the Australian continent • selects eight regions for more detailed assessment (five on the basis of application of the model, three as a result of consultation processes) • applies the model in more detail to those eight regions, and • concludes that all eight regions contained potentially suitable sites for a nuclear waste repository. 	<p>NRIC, <i>A Radioactive Waste Repository for Australia: Site Selection Study—Phase 2</i>, DPIE, Canberra, 1994.</p>
23 August 1994	<p>The Minister for Industry, Science and Technology announces that the CSIRO radioactive soil waste and the other radioactive waste at St Marys will be moved to Woomera for interim storage. The Commonwealth Environment Protection Agency will review final transport and storage arrangements.</p>	<p>'Statement from the Minister for Industry, Science and Technology, Senator Peter Cook', <i>Media Release</i>, 23 August 1994.</p>
17 November 1994	<p>As a result of the NSW court decision of February 1992, removal of the CSIRO waste from Lucas Heights to temporary storage in a Department of Defence facility at Woomera in South Australia commences. The program involves about 120 truckloads of drummed waste, and is completed by 7 January 1995. The shipments receive widespread publicity, particularly in South Australia, which is critical of the process.</p>	<p>Senate Select Committee on the Dangers of Radioactive Waste, <i>No Time to Waste</i>, 1996, p. 4.</p>

Milestones	Details	Source Documents
8 December 1994	A small amount of moist material was found on the side of a drum during transport by road from Lucas Heights to Woomera. The incident attracts the attention of the media and the South Australian Government. Tests performed by the SA Health Commission's Radiation Protection Branch find no radiation in the material above naturally occurring background levels.	'Leak of radioactive load', <i>Sydney Morning Herald</i> , 9 December 1994. CSIRO Public Affairs, 'Shipment of Low Level Radioactive Waste—No spillage confirmed', <i>Media Release</i> , no date [December 1994]
9 December 1994	South Australian Liberal Senator Grant Chapman gives notice of a motion in the Senate to establish a Senate Select Committee on the Dangers of Radioactive Waste. The Committee is formally established on 9 March 1995, despite the ALP government's opposition, and reports in April 1996.	<i>Senate Debates</i> , 9 December 1994, p. 4416 ; <i>Senate Journals</i> , 9 March 1995, p. 3059.
December 1994	In December 1994, the Queensland Government opens a new facility at Esk for the storage of radioactive waste. This followed from a 1991 EIS, which recommended the construction of a facility for the storage of radioactive waste at Esk. The facility was opposed by local community interests, particularly in the Wivenhoe Dam catchment area. Radioactive waste material that was in storage in Brisbane is moved to the facility.	Queensland Legislative Assembly, <i>Debates</i> , 9 October 1991 , p. 1466.
May 1995	The intermediate level radioactive waste in storage at St Marys is transported to a Department of Defence facility at Woomera. The Department of Defence had assumed administrative responsibility for the waste some time previously.	'Canberra firm on radioactive waste transfer', <i>The Age</i> , 22 March 1995; 'N-waste site search gains momentum', <i>The Australian</i> , 9 June 1995.
May 1995	ANSTO's MOATA reactor is closed down. The fuel is of US-origin. In due course, the US agrees to the spent fuel being repatriated, with no waste to be returned to Australia.	ANSTO, <i>Annual Report 1994–95</i> , ANSTO, Lucas Heights, p. 16.

Milestones	Details	Source Documents
20 June 1995	<p>The Parliamentary Standing Committee on Public Works tables its report on the Maralinga Rehabilitation project. The report outlines the objective of the project:</p> <p style="padding-left: 40px;">The proposed clean-up will reduce the radiological hazard at the test sites to enable Aboriginal traditional land use and transit of the test site area, reduce and possibly eliminate the need for control and surveillance of the sites and remove potential Commonwealth liabilities arising from contamination. It will also enable the land to revert to control of the South Australian Government which has indicated its intention to add the land to Maralinga Tjarutja freehold land (p. 1).</p>	<p>Parliamentary Standing Committee on Public Works, <i>Report Relating to the Proposed Maralinga Rehabilitation Project</i>, SA, Report no. 10 of 1995, Parliamentary Paper no. 109/1995.</p>
September 1995	<p>Maralinga clean-up operations commence with the construction of the camp that will be the base of operations. Clean-up operations themselves start in May 1996.</p>	
27 October 1995	<p>The Minister for Industry, Science and Technology (Senator Cook) and the Minister for Primary Industries and Energy (Senator Collins) announce that the Government has authorised ANSTO to negotiate terms for shipment of spent nuclear fuel of UK origin to Britain for reprocessing, which involves recovery of unused uranium for peaceful non-military purposes. The Ministers note that UK origin spent fuel comprises about half the (then) current holdings at Lucas Heights, the remaining holdings being of US origin.</p>	<p>'Spent nuclear fuel to leave Australia', <i>Media Release</i>, 27 October 1995.</p>
November 1995	<p>The Commonwealth releases its <i>Report on Public Comment</i> on Phase 2 of the site selection process for a low-level waste repository.</p>	<p>Department of Primary Industries and Energy, <i>National Radioactive Waste Repository Site Selection Study, Phase 2, Report on Public Comment</i>, AGPS, Canberra, 1995.</p>

Milestones	Details	Source Documents
19 April 1996	ANSTO ships 114 spent nuclear fuel rods to Dounreay, Scotland, for reprocessing. Wastes from the reprocessing are to be returned to Australia within 25 years in the form of a quantity of cemented, intermediate level radioactive waste.	Senator Meg Lees (Australian Democrats), 'Government must find answer to Dounreay waste', <i>Media Release</i> , 24 June 1996.
24 April 1996	The ALP government in NSW indicates it is opposed to the location of a nuclear waste repository in the Broken Hill area, one of the eight regions identified in the Phase 2 report on selecting a site for a low level nuclear waste repository.	'NSW refuses to aid N-dump', <i>Sydney Morning Herald</i> , 25 April 1996. <i>NSW Legislative Assembly Debates</i> , 24 April 1996, p. 471 .
29 April 1996	Senate Select Committee on the Dangers of Radioactive Waste releases its report, <i>No Time to Waste</i> . The report: <ul style="list-style-type: none"> • criticises the Department of Industry, Science and Technology for a lack of cooperation with the inquiry process • recommends that the Commonwealth's nuclear regulatory agency have no involvement in the nuclear industry • recommends that there be statutory third-party enforcement rights in radiation safety laws • suggests possible disposal of the lowest-level wastes in active uranium mines, and • that 'a national above ground storage facility be established which has the capacity to take low, intermediate and high level radioactive waste' (p. 134). 	Senate Select Committee on the Dangers of Radioactive Waste, <i>No Time to Waste</i> , Tabled 21 May 1996. Parliamentary Paper no. 7/1996.
13 May 1996	The US Department of Energy (DOE) issues a record of decision on the final environmental impact statement on foreign research reactor spent nuclear fuel. The decision outlines the provisions under which DOE will accept and manage spent US origin fuel arising from scientific research in foreign countries. Spent fuel shipped under the program must be out of the reactor by 12 May 2006 and arrive in the United States by 12 May 2009.	Record of Decision for the Final Environmental Impact Statement on a Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel , US Department of Energy, May 1996.

Milestones	Details	Source Documents
November 1996	<p>The Commonwealth Government responds to the <i>No Time to Waste</i> Report, indicating:</p> <ul style="list-style-type: none">• it is currently considering establishing a separate regulatory body• that third-party enforcement of the laws is unnecessary• willingness to conduct a feasibility study into disposal of certain low-level wastes in uranium mines, and• rejection of an above ground facility for all waste, maintaining that 'international standards and practice clearly indicate that near-surface disposal is appropriate' for low level waste.	<p><i>Senate Debates</i>, 21 November 1996, pp. 5831–36.</p>
1997	<p>The Commonwealth–State Consultative Committee on Radioactive Waste Management reaches in-principle agreement on the need for a national intermediate level waste store. The Committee also endorses the co-location of the intermediate level waste store with the low level waste repository, and the government accepts this as a possible approach.</p>	<p><i>Safe Storage of Radioactive Waste: The National Store Project: Methods for Choosing the Right Site: Report Responding to Public Comment</i>, Department of Industry, Science and Resources, 2002, p. 13.</p> <p>Senator Warwick Parer, 'SA region selected for National Radioactive Waste Repository site', <i>Media Release</i>, 18 February 1998.</p>

Milestones	Details	Source Documents
3 September 1997	<p>The Minister for Science and Technology (Mr McGauran) announces construction of a replacement research reactor at Lucas Heights, to be commissioned in 2005, at a cost of \$286 million. The announcement also states:</p> <ul style="list-style-type: none"><li data-bbox="472 600 1098 925">• The Government will establish a new agency, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) 'to regulate and licence the Commonwealth's future nuclear and radiation activities. ARPANSA will combine the existing resources of the Australian Radiation Laboratory and the Nuclear Safety Bureau. It will be headed by a statutory office holder ... reporting to the Minister for Health and Family Services'.<li data-bbox="472 954 1098 1149">• 'The Government has decided not to establish a reprocessing facility at Lucas Heights or anywhere else in Australia. Instead, \$88 million has been set aside to remove spent nuclear fuel rods from Lucas Heights and meet the costs of reprocessing offshore'.<li data-bbox="472 1178 1098 1294">• 'Australia is to enter into a contract with the US Government to repatriate 689 spent fuel elements of US origin. Shipments will begin in the next 12 months. No waste will be returned'.<li data-bbox="472 1323 1098 1518">• 'The balance of about 1300 spent fuel elements from HIFAR's [lifetime] operations will be shipped to Dounreay, Scotland for reprocessing, with shipments to begin in the next two years. The wastes will be encapsulated in cement and returned to Australia in about 10 to 20 years'.<li data-bbox="472 1547 1098 1664">• 'All overseas shipments of spent nuclear fuel will be subject to a strict environmental assessment process under the Environmental Protection Act 1974 (sic)'.	'Nuclear reactor replaced', <i>Media Release</i> , 3 September 1997.

Milestones	Details	Source Documents
2 October 1997	<p>The Senate refers to the Senate Economics References Committee the question of whether a new reactor should be built to replace the High Flux Australian Reactor (HIFAR). The terms of reference include whether the issues raised by the 1993 Research Reactor Review have been satisfactorily addressed in the context of the decision to proceed with a new reactor at Lucas Heights.</p>	<p><i>Senate Debates</i>, 2 October 1997, p. 7433.</p>
November 1997	<p>The Commonwealth releases its report <i>National Radioactive Waste Repository Site Selection Study, Phase 3</i>, as part of an information kit and consultation process, for public comment by April 1998. The Phase 3 report:</p> <ul style="list-style-type: none"> • uses improved data sets to re-apply the ASSESS model to the eight regions identified in Phase 2 • states that the aim of the process is 'to select the region with the largest areas of high suitability' (p. 10), and • concludes that the preferred region for detailed assessment is Billa Kalina, the region of outback South Australia that happens to include Australia's largest uranium mine (Roxby Downs) and Woomera, to which a considerable amount of radioactive waste had already been transported in 1995. 	<p>Bureau of Resource Sciences, <i>A Radioactive Waste Repository for Australia: Site Selection Study—Phase 3 Regional Assessment</i>, Bureau of Resource Sciences, Canberra, 1997.</p>
April 1998	<p>ANSTO ships 240 spent nuclear fuel rods from Lucas Heights to the United States. No waste will return to Australia from the US shipment.</p>	<p>Parliamentary Standing Committee on Public Works, Proposed replacement research reactor, Lucas Heights, NSW, August 1999, p. 68.</p>
May 1998	<p>In-situ vitrification of old British nuclear waste burial pits commences as part of the Maralinga clean-up process. The technique, developed in the United States in the 1990s, involves passing massive electrical currents into the ground, heating it to temperatures of 1400 to 2000°C, causing it to melt and then solidify to form a glass-like solid that is highly resistant to weathering, locking in radioactive contaminants.</p>	<p>Maralinga Rehabilitation Technical Advisory Committee, Rehabilitation of Former Nuclear Test Sites at Emu and Maralinga (Australia) 2003, Department of Education, Science and Training, 2002.</p>

Milestones	Details	Source Documents
5 June 1998	<p>The UK Government announces that Dounreay will take on no further commercial reprocessing work. This announcement has the effect of precluding the new contract with ANSTO for reprocessing HIFAR spent fuel that was envisaged in the announcement of 3 September 1997.</p>	<p>United Kingdom Atomic Energy Authority, 'Commercial reprocessing to cease at Dounreay', <i>Media Release</i>, 5 June 1998.</p>
1 December 1998	<p>A promotional video prepared by a nuclear waste management consortium, Pangea Resources, is leaked to the Australian media. The video recommends outback Australia as a suitable location for a geological repository for international high level nuclear waste. The Minister for Industry, Science and Resources (Senator Minchin) confirms bipartisan opposition to such a development, and states that:</p> <p style="padding-left: 40px;">no high level radioactive waste facility is planned for Australia and the government has absolutely no intention of accepting the radioactive waste of other countries. The policy is clear and absolute and will not be changed. We will not be accepting radioactive waste from other countries.</p> <p>This position is also reflected in already-existing Customs regulations.</p>	<p><i>Senate Debates</i>, 1 December 1998, p. 952.</p> <p><i>Customs (Prohibited Imports) Regulations 1956</i>, Regulation 4R.</p>
January 1999	<p>Following the UK Government's decision to end the reprocessing of spent fuel rods at the Dounreay facility in Scotland, ANSTO contracts with French reprocessing company, Cogema, to reprocess Australia's holdings of UK-origin HIFAR spent fuel and all future arisings of spent fuel for the remainder of HIFAR's service life, and to reprocess the spent fuel from the replacement reactor. The waste from reprocessing HIFAR spent fuel is scheduled to be returned to Australia in a single shipment in 2015 at the latest.</p>	<p>ANSTO, Annual Report 1998–99, p. 47.</p>

Milestones	Details	Source Documents
5 February 1999	<p><i>Australian Radiation Protection and Nuclear Safety Act 1998</i> comes into force. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is to be the Commonwealth's licensing agency for nuclear facilities and radioactive waste disposal facilities.</p> <p>ARPANSA is part of the Health portfolio, and is formed by the amalgamation of the Australian Radiation Laboratory and the Nuclear Safety Bureau. For the first time, 'all Commonwealth radiation and nuclear activities will come under the scrutiny of an independent regulatory agency'.</p> <p>In due course, ARPANSA commences the 'Radiation Protection Series' of publications, replacing the NHMRC's 'Radiation Health Series'.</p>	<p>Australian Radiation Protection and Nuclear Safety Act 1998</p> <p>ARPANSA website</p> <p>National Archives of Australia, Agency Notes for agency CA 8736.</p> <p>Australian Radiation Protection and Nuclear Safety Bill 1998, Bills Digest no. 211, Department of the Parliamentary Library, 1997–98.</p> <p>Nuclear Safety Bureau, Annual Report 1996–97, p. 3.</p>
21 March 1999	<p>An explosion occurs during the in-situ vitrification processing of a contaminated waste pit during the Maralinga clean-up operations. After extensive reviews and debate, it is not possible to identify the cause of the explosion. The in-situ vitrification process is abandoned due to end product quality concerns and safety concerns, and the remaining pits are treated by exhumation and reburial.</p>	<p>Maralinga Rehabilitation Technical Advisory Committee, Rehabilitation of Former Nuclear Test Sites at Emu and Maralinga (Australia) 2003, Department of Education, Science and Training, 2002.</p>
June 1999	<p>The Commonwealth releases its <i>Report on Public Comment</i> on Phase 3 of the site selection process for a low level waste repository.</p>	<p>Department of Industry, Science and Resources, National Radioactive Waste Repository Site Selection Study, Phase 3, Report on Public Comment, AGPS, Canberra, 1999.</p>

Milestones	Details	Source Documents
11 August 1999	<p>The Western Australian ALP Opposition, reacting to the leaked Pangea high-level waste dump proposal, introduces into the West Australian Parliament the Nuclear Waste Storage Facility (Prohibition) Bill 1999. The Bill is intended to enshrine in law a prohibition on establishing a facility that would store radioactive material derived from nuclear reactors, weapons, reprocessing facilities or isotope enrichment plants. The government supports the bill, with some amendments.</p>	<p><i>Western Australian Legislative Assembly Debates</i>, 11 August 1999; 13 October 1999.</p>
1 September 1999	<p>The report of the Senate Economics References Committee, <i>A New Reactor at Lucas Heights</i>, is tabled in the Senate. It was a majority report by the Opposition and Democrat Committee members.</p> <p>The Committee proposes that a public inquiry be conducted into the Government's decision to construct the replacement reactor. Its recommendations include that:</p> <ul style="list-style-type: none"> • the issue of the management of spent fuel rod reprocessing waste be further considered by the proposed public inquiry, and • no new reactor be constructed until a permanent site for disposal of the Lucas Heights nuclear waste is determined. <p>The minority report by Government Senators endorsed the Government's decision to proceed with the construction of a replacement for HIFAR.</p>	<p>Senate Economics References Committee, A New Reactor at Lucas Heights, September 1999.</p>
22 September 1999	<p>Following consideration of an application from ANSTO, the CEO of ARPANSA issues ANSTO with a licence to prepare the Lucas Heights site for the Replacement Research Reactor.</p>	<p>ARPANSA, Licence and Conditions Authorizing the Australian Nuclear Science and Technology Organization (ANSTO) to Prepare a Site for the Replacement Research Reactor</p>
26 November 1999	<p>ANSTO despatches its first shipment of spent fuel—308 rods—to Cogema for reprocessing.</p>	<p>ANSTO, <i>Annual Report 1999–00</i>, Core nuclear facilities operation and development.</p>

Milestones	Details	Source Documents
7 December 1999	Western Australia's <i>Nuclear Waste Storage Facility (Prohibition) Act 1999</i> takes effect, with the objective of 'prohibiting the establishment of a nuclear waste storage facility in this State or the use of any place in this State for the storage or disposal of nuclear waste' (section 4).	Nuclear Waste Storage Facility (Prohibition) Act 1999
late 1999 – early 2000	Aboriginal residents in the Billa Kalina region, including the Kupa Piti (Kungka) Tjuta (Coober Pedy Aboriginal Women's Council), indicate their opposition to the construction of a low level waste repository in the Billa Kalina area, which is the Commonwealth's preferred site for the facility.	<i>Kupa Piti Kungka Tjuta</i> , irati wanti website
November 1999–May 2000	The leaked Pangea high-level waste dump idea, together with Commonwealth proposals for a national waste repository, stir up sufficient anti-nuclear sentiment in South Australia that the Government, Opposition and the Australian Democrats each introduce separate Bills into the South Australian Parliament aimed at banning the construction of nuclear waste management facilities, with the exception of facilities to manage low level wastes. The Democrats introduce the first Bill, in late 1999, followed by the ALP Opposition in April 2000, and finally the Liberal government in May. The Opposition and Democrats' Bills are both called the Nuclear Waste Storage Facility (Prohibition) Bill, while the government's Bill is the Nuclear Waste Storage Facility (Prohibition No. 2) Bill.	<i>South Australian Assembly Debates</i> , 13 April 2000 , p. 923; 31 May 2000 , p. 1313. <i>South Australian Legislative Council Debates</i> , 17 November 1999 .
1 March 2000	ARPANSA declares the remediation work at Maralinga is satisfactory, thus marking the clean-up project's official completion. It is anticipated that there will be a process by which the land will be returned to the South Australian Government, and then to the local Aboriginal people.	Senator Nick Minchin, ' Main Maralinga test sites now clean ', Media Release, 1 March 2000.
6 June 2000	The Minister for Industry, Science and Resources announces the preferred tenderer for the design and construction of the replacement research reactor at Lucas Heights. The preferred tenderer is the Argentinian company, INVAP, in alliance with Australian companies, John Holland Construction & Engineering Pty Ltd and Evans Deakin Industries Limited.	'Preferred tenderer for replacement research reactor announced' , <i>Media Release</i> , 6 June 2000.

Milestones	Details	Source Documents
May–June 2000	<p>Controversy develops around the process of locating and tendering for the replacement research reactor, its budget, and implications of its possible design. This leads to the Senate agreeing to a motion that there be laid on the table by the Minister for Industry, Science and Resources any documents held by ANSTO relating to:</p> <ul style="list-style-type: none"> • the nature of the fuel required in the new nuclear reactor at Lucas Heights, and • the implications of the fuel specification for the type and nature of waste produced by the reactor. 	<p>Fred Brenchley, 'Core promises', <i>The Bulletin</i>, 16 May 2000, pp. 32–4; 'No solution to reactor's fuel problems', <i>Adelaide Advertiser</i>, 19 June 2000.</p> <p><i>Senate Journals</i>, no. 125, 26 June 2000, p. 2893.</p>
13 July 2000	<p>The Minister tabled relevant documents on 26 June.</p> <p>ANSTO enters into a contract with INVAP for the construction of the replacement nuclear research reactor (RRR) at Lucas Heights.</p> <p>The contract includes a provision whereby INVAP, if requested, will arrange for the fuel to be processed in Argentina or provide an alternative solution for spent fuel from the RRR. The solution must not involve direct disposal of spent fuel in Australia, reprocessing in Australia, or indefinite storage of spent fuel in Australia. Any waste returned to Australia is to be long-lived intermediate level waste. A treaty between Australia and Argentina is needed to underpin this provision.</p>	<p>ANSTO, 'Contract signed for Australia's history-making Replacement Research Reactor', <i>Media Release</i>, 13 July 2000.</p>
3 August 2000	<p>The CEO of ARPANSA says that by the time he is considering issuing a licence for the operation of the replacement research reactor, 'spent fuel arrangements would want to be written in blood and be able to be implemented and the store [for waste from spent nuclear fuel reprocessing and other long-lived intermediate level waste] would need to be pretty well on track so we would have confidence that it would be located and built by [the time it was needed for management of waste from reprocessing]'</p>	<p>'No dump, no new reactor', <i>St George and Sutherland Leader</i>, 3 August 2000.</p>

Milestones	Details	Source Documents
11 August 2000	The Commonwealth announces the formal commencement of the search for a site for a storage facility for intermediate level radioactive waste. The announcement fuels conflict over whether South Australia should host both the low and intermediate level waste repository sites.	Senator Nick Minchin, ' Search for a site for the national store for intermediate level radioactive waste ', <i>Media Release</i> , 11 August 2000.
15 August 2000	<p>The Senate establishes a Select Committee to inquire into the contract for a new reactor at Lucas Heights. The management of spent fuel and other wastes is one aspect of the Committee's terms of reference.</p> <p>The Committee receives evidence that the clause in the contract relating to the possible processing of spent fuel in Argentina is invalid because it is in conflict with the Argentine Constitution. This evidence is refuted by the Argentine Ambassador in his evidence.</p>	<p><i>Senate Debates</i>, 15 August 2000, p. 16351.</p> <p>Dr Montenegro, Senate Select Committee for an Inquiry into the contract for a new reactor at Lucas Heights, <i>Evidence</i>, 27 October 2000, p. 258; Ambassador Stancanelli, <i>Evidence</i>, 6 November 2000, pp. 370–1.</p>
November 2000	The South Australian Parliament passes the <i>Nuclear Waste Storage Facility (Prohibition) Act 2000</i> , which is the result of a South Australian government Bill (see November 1999 entry, above).	Nuclear Waste Storage Facility (Prohibition) Act 2000
23 January 2001	ANSTO despatches the second shipment of spent fuel—360 rods—to Cogema for reprocessing. With this shipment, more than half the spent fuel arising over the entire lifetime of the HIFAR reactor has been sent overseas.	ANSTO, Annual Report 2000–01 , pp. 23–4.
24 January 2001	The Minister for Industry, Science and Resources (Senator Minchin) announces that a preferred site has been chosen for the low level waste repository. The site, known both as 52a and Evetts Field West is within the Woomera Prohibited Area. That site, together with two others nearby (45a and 40a), are to undergo environmental assessment under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> to determine their suitability.	Senator Nick Minchin, ' Preferred site for national low level radioactive waste repository to undergo environmental assessment ', <i>Media Release</i> , 24 January 2001.

Milestones	Details	Source Documents
8 February 2001	<p>The Minister for Industry, Science and Resources issues a media release in which the Minister says the Federal Government will establish a purpose built facility on Commonwealth land for the storage of national intermediate level radioactive waste produced by Commonwealth agencies. The Minister says he has 'ruled out co-location of the national intermediate level radioactive waste store with the national low level repository in South Australia'.</p>	<p>Senator Nick Minchin, 'Intermediate radioactive waste store to be built on Commonwealth land', <i>Media Release</i>, 8 February 2001.</p>
March 2001	<p>Greenpeace takes legal action in France that delays the unloading at the French port of Cherbourg of the consignment of spent fuel that was despatched by ANSTO in January 2001. Cogema appeals and the court upholds the appeal.</p> <p>Subsequently, Greenpeace attempts to prevent the reprocessing of Australian spent fuel by taking action on other grounds against Cogema in the French courts (see 3 February 2003, below).</p>	<p>'French court ruling puts cloud over reactor', <i>The Australian</i>, 17 March 2001; 'Court reverses nuclear waste decision', <i>Sydney Morning Herald</i>, 4 April 2001.</p>

Milestones	Details	Source Documents
May 2001	<p>The Senate Select Committee for an Inquiry into the contract for a new reactor at Lucas Heights delivers its report. It is a majority report by the Opposition and Democrat Committee members. It:</p> <ul style="list-style-type: none"> • criticises the government for allegedly not heeding the recommendations of the Research Reactor Review of 1993 • recommends that, in the light of growing opposition overseas, ANSTO prepare and fully cost a contingency management plan for spent fuel conditioning and disposal within Australia. This plan should fully describe the technologies to be used should Australia have to manage its spent fuel wholly within Australia, and • recommends 'that the Government satisfactorily resolve the question of the safe disposal of new reactor spent fuel before approval to construct a new reactor is given' (p. 230). <p>In their minority report, Government Senators say that they are satisfied that the Government is putting in place concrete measures to ensure that the problem of the ultimate disposal of intermediate level waste will be resolved before approval to construct the replacement reactor is given.</p> <p>In a supplementary report, the Australian Democrats say they have no confidence that the arrangements for reprocessing spent fuel and the arrangements for storing the waste returned to Australia from overseas are guaranteed or reliable.</p>	<p>Senate Select Committee for an Inquiry into the contract for a new reactor at Lucas Heights, A New Research Reactor? May 2001.</p>
23 June 2001	<p>The Commonwealth issues final guidelines for the preparation of the Environmental Impact Statement on the proposed national Low Level Radioactive Waste Repository Project.</p>	<p>Guidelines: Environmental Impact Statement: Proposed National Low Level Radioactive Waste Repository Project, Environment Australia, June 2001.</p>

Milestones	Details	Source Documents
July 2001	<p>The Commonwealth releases its report <i>Safe Storage of Radioactive Waste: The National Store Project: Methods for Choosing the Right Site</i>, for public comment by 31 August. The report:</p> <ul style="list-style-type: none"> describes the intermediate level waste to be stored, and distinguishes it from low level waste, and outlines the site assessment methodology to be used in the project. This will involve using the ASSESS geographic information system already utilised in the low level waste repository process. 	<p>Safe Storage of Radioactive Waste: The National Store Project: Methods for Choosing the Right Site, Department of Industry, Science and Resources.</p>
8 August 2001	<p>The Minister for Foreign Affairs and the Argentine Foreign Minister sign the <i>Agreement between Australia and the Argentine Republic concerning Cooperation in Peaceful Uses of Nuclear Energy</i>.</p> <p>As of August 2003 the treaty partners were yet to ratify the Agreement.</p>	<p>Agreement between Australia and the Argentine Republic Concerning Cooperation in Peaceful Uses of Nuclear Energy</p> <p>Department of Foreign Affairs, <i>Agreement between Australia and the Argentine Republic [etc]: National Interest Analysis</i>.</p>
August 2001	<p>ARPANSA's Radiation Health and Safety Advisory Council endorses a revised <i>Code of Practice for the Safe Transport of Radioactive Material</i>.</p>	<p>ARPANSA, Code of Practice for the Safe Transport of Radioactive Material, Radiation Protection Series no. 2, ARPANSA, Victoria.</p>
4 April 2002	<p>The CEO of ARPANSA issues 'a licence to ANSTO to allow them to construct the proposed Replacement Research Reactor at Lucas Heights'. Construction begins a few days later.</p> <p>Subsequently, Greenpeace challenges in the Federal Court the CEO's decision to issue the licence for the construction of the reactor (see 13 September 2002, below).</p>	<p>ARPANSA, Licence for ANSTO to construct a controlled facility, 4 April 2002.</p>

Milestones	Details	Source Documents
3 May 2002	The Commonwealth releases its <i>Report Responding to Public Comment on the Safe Storage of Radioactive Waste: The National Store Project: Methods for Choosing the Right Site</i> .	<i>Safe Storage of Radioactive Waste: The National Store Project: Methods for Choosing the Right Site: Report Responding to Public Comment</i> , Department of Industry, Science and Resources.
27 July 2002	The <i>Draft Environmental Impact Statement for the National Low Level Radioactive Waste Repository</i> is released for public comment. Submissions are accepted until 23 October. Six hundred and sixty seven submissions are received.	Draft Environmental Impact Statement for the National Radioactive Waste Repository , Department of Education, Science and Training.
13 September 2002	The Federal Court dismisses Greenpeace's challenge to the decision by the CEO of ARPANSA to issue a licence for the construction of the replacement research reactor.	' Greenpeace fails to stop nuclear reactor ', <i>The Australian</i> , 14 September 2002.
23 January 2003	Final Environmental Impact Statement for the National Low Level Radioactive Waste Repository is released.	Supplementary report on draft Environmental Impact Statement for the National Repository Project , Department of Education, Science and Training.
3 February 2003	Media reports emerge that the Department of Defence had concerns about the preferred site for the low level waste repository, claiming 'Defence officials have warned Senator Hill the EIS drafted by DEST was misleading, failed to adequately consult Defence and misjudged missile impact risks and radiation exposures' (3 February).	' Defence drops bomb on N-dump ', <i>The Australian</i> , 3 February 2003; ' Waste dump risks understated: Hill ', <i>The Australian</i> , 12 February 2003. Senate Environment, Education, Information Technology and the Arts Legislation Committee, <i>Estimates Debates</i> , 11 February 2003 .

Milestones	Details	Source Documents
3 February 2003	The Cherbourg county court dismisses Greenpeace's action to prevent the reprocessing of Australian spent fuel by Cogema, ruling that Australian spent fuel rods imported by Cogema for reprocessing at La Hague are not waste in the eyes of the law and that Cogema is not violating French law by storing them at the reprocessing complex.	' Cherbourg court rules against Greenpeace France and Manche Nature ', <i>Media Release</i> , 3 February 2003.
March 2003	The final report of the Maralinga Rehabilitation Technical Advisory Committee is tabled. The report provides a comprehensive review of the Maralinga clean-up process and sets out the basis for the Committee's conclusion that 'the rehabilitation program as implemented has achieved its objectives' (p. li).	Maralinga Rehabilitation Technical Advisory Committee, Rehabilitation of Former Nuclear Test Sites at Emu and Maralinga (Australia) 2003 , Department of Education, Science and Training, 2002.
8 May 2003	The NSW Government announces a parliamentary inquiry into the sourcing, transport and storage of radioactive waste.	NSW Legislative Assembly, <i>Votes and Proceedings</i> , 8 May 2003, item 17(12), p. 90.
9 May 2003	Following controversy over Department of Defence resistance to siting a nuclear waste repository at the preferred location, 52a, the Commonwealth announces that site 40a on a pastoral property called Arcoona Station (one of two alternative locations analysed in the Environmental Impact Statement) will be the location of the low level waste dump.	' N dump named ', <i>Daily Telegraph</i> , 10 May 2003.
9 May 2003	The Minister for Science (Mr McGauran) announces that South Australia will be ruled out as the host for the national intermediate level nuclear waste store. Western Australia and the Northern Territory both react immediately, indicating they will fight any proposal from the Commonwealth to site the store in their jurisdiction.	Peter McGauran MP, ' SA ruled out ', <i>Media Release</i> , 9 May 2003. ' Premier warns Commonwealth to keep its waste out of WA ', <i>Media Release</i> , 9 May 2003; ' No nuclear waste dump for the Territory ', <i>Media Release</i> , 9 May 2003.

Milestones	Details	Source Documents
2 June 2003	<p>The South Australian government, which has strongly opposed the siting of the low level waste repository in its State, believes it has found a way to stop the federal government from putting the dump in South Australia. Premier Mike Rann (ALP) draws attention to section 42 of the Commonwealth's <i>Lands Acquisition Act 1989</i>, which states that the Commonwealth may not make a compulsory land acquisition of:</p> <p style="padding-left: 40px;">an interest in land that consists of, or is in, a public park unless the Government of the State or Territory in which the land is situated has consented to the acquisition of the interest.</p> <p>South Australia accordingly announces its intention to declare the Commonwealth's preferred site as a public park.</p>	<p>'Parkland 'ploy' for dump site', <i>The Australian</i>, 3 June 2003.</p> <p>Lands Acquisition Act 1989.</p>
7 July 2003	<p>The Federal government successfully pre-empts the South Australian strategy, by compulsorily acquiring the land for the low level waste repository before South Australia parliament has the time to pass a law declaring the site a park. The Finance Minister (Senator Minchin) conceded that, had the South Australian law passed, compulsory acquisition would not have been possible.</p>	<p>'Canberra buys land for nuke dump site', <i>The Australian</i>, 8 July 2003.</p>

Further information online

Department of Education, Science and Training's Radioactive Waste Management website:

<http://www.dest.gov.au/radwaste/>

Australian Radiation Protection and Nuclear Safety Agency website:

<http://www.arpsa.gov.au>

Australian Nuclear Science and Technology Organisation website:

<http://www.ansto.gov.au>

Further reading

Alice Cawte, *Atomic Australia 1944–1990*, University of New South Wales Press, Sydney, 1992.

Ian Holland, 'Consultation, Constraints and Norms: The Case of Nuclear Waste', *Australian Journal of Public Administration*, vol. 61, no. 1, 2002, pp. 76–86.

Ian Holland, 'Waste Not Want Not? Australia and the Politics of High Level Nuclear Waste', *Australian Journal of Political Science*, vol. 37, no. 1, 2002, pp. 283–301.

Ann Moyal, 'The Australian Atomic Energy Commission: A Case Study in Australian Science and Government', *Search*, Vol. 6, No. 9, 1975, pp. 365–84.

Rod Panter, 'Radioactive Waste Disposal in Australia', *Issue Paper* no. 6, 1992, Parliamentary Research Service, Canberra.

J.F. Richardson, *The Australian Radiation Laboratory: A Concise History 1929–1979*, AGPS, Canberra, 1981.