

National Radioactive Waste Repository Site Selection Study

PHASE 3

A Report on Public Comment

June 1999

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1. Background

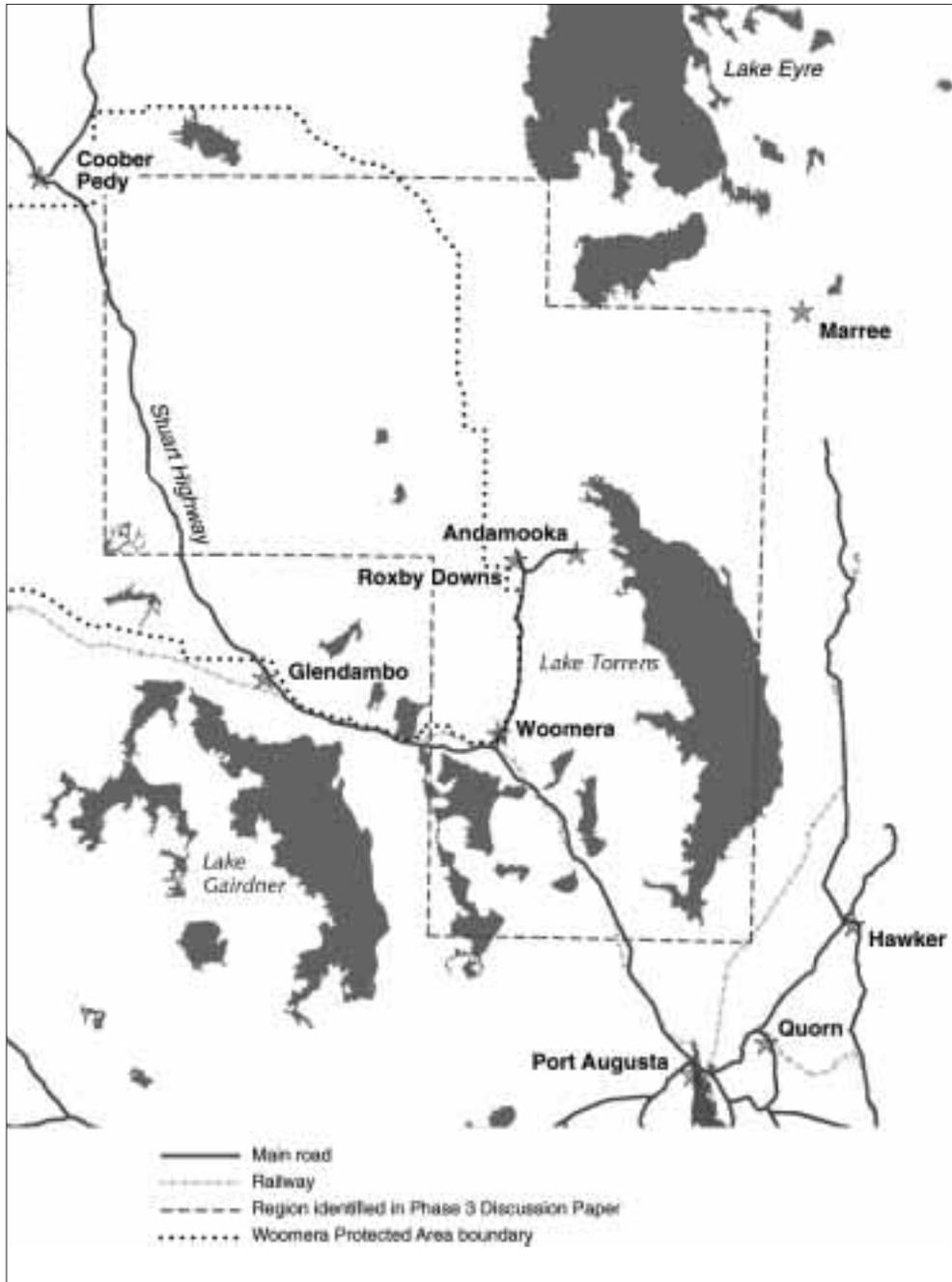
Australia requires a national repository and a long-lived intermediate level radioactive waste store for the small quantities of radioactive wastes resulting from the medical, industrial and research use of radioisotopes in Australia. These wastes are in temporary storage at numerous locations around Australia, including at hospitals and universities. A national facility for Australia's radioactive wastes is preferable to current temporary arrangements and would be more efficient than establishing separate disposal and long-term storage facilities in each State and Territory.

The Government considers that the establishment of a national near-surface repository for low level and short-lived intermediate level radioactive waste and a national store for long-lived intermediate level waste is a responsible, feasible and comprehensive strategy for the long-term management of Australia's small quantity of radioactive waste.

In 1992 the Commonwealth Government commenced an Australia-wide search for a suitable site for the near-surface disposal of Australia's low level and short-lived intermediate level radioactive waste. The national radioactive waste repository project is being managed by the Commonwealth Department of Industry, Science and Resources (previously the responsibility of the Department of Primary Industries and Energy). The Bureau of Rural Sciences (previously the Bureau of Resource Sciences) is conducting technical studies as part of the site selection study for the national radioactive waste repository.

The Commonwealth Government is committed to the establishment of a national repository for Australia's low level and short-lived intermediate level radioactive waste. To secure the benefits of shared infrastructure, the Government has also indicated that it will consider co-locating, with the repository, a store for Australia's long-lived intermediate level radioactive (Category S) waste. In considering these matters the Government is committed to thorough community consultation.

Figure 1. The central-north region of South Australia



2. Introduction

The Phase 3 discussion paper, *A Radioactive Waste Repository for Australia: Site Selection Study – Phase 3 Regional Assessment*, released in February 1998 identified the Billa Kalina region of South Australia as the preferred region for location of the proposed national radioactive waste repository and possible co-location of a long-lived intermediate level waste store. A copy of the media release issued by the then Minister for Resources and Energy announcing the preferred region is provided at **Annex A**. The name Billa Kalina was adopted from the geological map sheet upon which the region's boundaries are based. The region is now referred to as the central-north region of South Australia to avoid any confusion with the Billa Kalina Station and because the map sheet boundaries are arbitrary and do not designate the limits of potential suitability with respect to the site selection criteria. The region covers approximately 67,000 square kilometres. The area required for the site, including a large buffer zone, is only 2.25 square kilometres. The general location of the central-north region of South Australia is shown on the map provided at **Figure 1**.

In June 1998, 18 sites were identified for field investigation based on a desktop assessment of the region against the site selection criteria. On the basis of the regional consultation process and site inspections by Aboriginal groups, the locations of some sites were changed and some alternative sites were identified. Field investigation of up to 18 sites in the region will be undertaken to identify a preferred repository site along with two alternatives.

It is expected that the preferred site will be announced late in 1999. Once a preferred site is identified, the proposal for a national radioactive waste repository will be subject to detailed environmental assessment and further public review as required under relevant statutory processes, including for example the Commonwealth *Environment Protection (Impact of Proposals) Act 1974*. If the site is considered suitable for co-location of a store for long-lived intermediate level radioactive waste, the store would be subject to similar review.

3. Purpose of Report

The purpose of this report is to summarise and respond to submissions received on the discussion paper, *A Radioactive Waste Repository for Australia - Site Selection Study – Phase 3 Regional Assessment*, and to comments raised during regional consultation in the central-north region of South Australia.

As well as written submissions on the discussion paper, public comment has been received through a variety of means including a toll free information line, a temporary regional information office, meetings with key community groups, a regional consultative committee, community information days and media monitoring.

This report addresses key matters relevant to Phase 3 of the site selection study, in particular, the consultation process to date, the selection of sites for field investigation, co-location of a long-lived intermediate level waste store and a private company's proposal for an international high level radioactive waste repository in Australia.

Copies of this report are being sent to all groups, organisations and individuals who provided written comment or expressed an interest in the site selection study. In addition, it will be circulated to any identified organisations, groups and individuals with an interest in the central-north region of South Australia.

4. Identification of Sites for Investigation

On 10 June 1998, the then Minister for Resources and Energy, Senator Warwick Parer, announced that Australia's national radioactive waste repository would be located on one of eighteen possible sites identified for further intensive testing within the central-north region of South Australia. A copy of the Minister's media release is provided at **Annex B**. The 18 sites were identified on the basis of desktop studies involving analysis of available technical data and information provided by stakeholders, against the site selection criteria. As a result of information provided by Aboriginal groups following their inspection of the 18 sites, the locations of some sites were changed and some alternative potentially suitable sites were identified for investigation to avoid areas of Aboriginal significance. Some of the alternative sites are located outside the Billa Kalina map sheet boundaries but are in the general region. The alternative sites were identified on the basis of the site selection criteria and consultation with Aboriginal groups, aimed at avoiding areas of significance.

5. Co-location of an Above-Ground Store for Long-lived Intermediate Level Radioactive Waste

A purpose built above-ground national storage facility is required for the safe management of Australia's long-lived intermediate level radioactive waste. The store will be for long-lived intermediate level radioactive waste arising from research, medical and industrial use of radioisotopes including sealed radium sources and wastes from the production of radiopharmaceuticals. The store is expected to also eventually accommodate the small volume of long-lived intermediate level waste to be returned to Australia from overseas reprocessing of Australia's research reactor spent fuel. Spent fuel will not be stored at the site. Further information on the long-lived intermediate level radioactive wastes to be accepted at the store is provided under the heading "Wastes to be accepted at the site".

The Phase 1 discussion paper, *A Radioactive Waste Repository for Australia: Methods for Choosing the Right Site*, released in October 1992, identified the possibility of co-locating a store for long-lived intermediate level radioactive waste with the national radioactive waste repository. The Government, in its response to the report of the *Senate Select Committee on the Dangers of Radioactive Waste (November 1996)*, accepted in principle a recommendation to establish a storage facility for long-lived intermediate level radioactive waste which was not suitable for near-surface disposal. It stated that establishment of such a facility would be raised with the Commonwealth/State Consultative Committee on the Management of Radioactive Waste (**Information Box No. 1**). The Government also indicated in its response that it would consider the possible co-location of an above-ground store for long-lived intermediate level waste with the near-surface repository in order to secure the benefits of shared infrastructure.

Information Box No.1 *Commonwealth/State Consultative Committee on the Management of Radioactive Waste*

The Commonwealth/State Consultative Committee on the Management of Radioactive Waste was established in 1980 to develop coordinated policies for the management of Australia's radioactive waste. The Committee comprises technical experts and policy advisers in the area of radioactive waste management from Commonwealth, State and Territory Governments.

The Committee was originally specifically required to look at management of radioactive waste from the medical, industrial and research use of radioisotopes. The Committee's terms of reference were amended in 1997 following agreement between Commonwealth/State and Territory Governments that the terms of reference were too narrow and required updating to enable the Committee to address the broad range of issues facing Australia in the area of radioactive waste management today and related issues likely to arise in the future.

The Committee's amended terms of reference are provided at **Annex C**.

The Commonwealth/State Consultative Committee on the Management of Radioactive Waste supports the need for a national store for long-lived intermediate level radioactive waste, and, in 1997, endorsed consideration of co-locating such a facility with a national near-surface repository.

Whether co-location of a store with the repository is possible will be determined once a preferred site is identified or potentially earlier if all short-listed sites are suitable. A recommendation would then be made to the Government, taking into account consultation with stakeholders, on whether to proceed with a proposal for co-location of a store with the repository. Long-lived intermediate level radioactive waste would remain in storage at a national site until a deep geological disposal facility or alternative management arrangements are available or necessary. The cost of constructing a deep disposal facility for long-lived intermediate level radioactive waste is not presently justified given the small quantity of such waste in storage and estimated future arisings. Establishment of any future final disposal facility for this waste would be the subject of a site selection study separate from the current study for the national repository.

Both the store and the repository would be designed and operated to ensure the protection of the environment and to ensure the safety of its workers and the general public. The transport of radioactive waste to the facility would be in accordance with rigorous standards set out in the national *Code of Practice for the Safe Transport of Radioactive Substances* and relevant State and Territory regulations to ensure worker and public safety.

Before a final decision is made on the siting of a repository and co-location of a long-lived intermediate level radioactive waste store, a thorough environmental and safety assessment will be undertaken in full consultation with stakeholders.

6. No High Level Radioactive Waste Repository for Australia

In 1998 and early 1999, there was wide media coverage of a proposition by a company called Pangea Resources Australia Pty Ltd, that Australia appeared suitable, both geologically and politically, for the siting of an international high level radioactive waste repository. Successive Australian Governments have agreed that Australia should not accept the radioactive wastes of other countries. This policy was restated on 1 December 1998 by the Minister for Industry, Science and Resources, Senator the Honourable Nick Minchin. In responding to a question in Parliament, Senator Minchin said that *“the policy is clear and absolute and will not be changed.”*

In late February 1999, Pangea approached the Government’s strategic investment coordinator seeking support for a proposal to establish an international radioactive waste repository in Australia. Senator Minchin has responded to Pangea reiterating that the Government’s policy prohibiting the importation and disposal of other countries’ radioactive waste *“is absolute and will not be changed”*. He also made it clear in his letter that the Government has no intention of considering Pangea Resources’ proposal for such a project.

The Government’s position is based on the clear principle that countries deriving benefits from nuclear power should expect to make their own arrangements to safely dispose of their nuclear waste. As Australia does not have a nuclear power industry and does not produce high level radioactive waste, **no high level radioactive waste facility is planned for Australia.**

There has been suggestion that there is an obligation for Australia, as an exporter of uranium, to accept radioactive waste from the nuclear industry. Australia’s involvement in the uranium mining industry in no way obligates Australia to accept wastes resulting from the nuclear power industry. Application of this philosophy across all industries that export raw materials, such as minerals, would be unreasonable.

Views expressed by certain companies and individuals as to the suitability of Australia to host an international high level radioactive waste repository are totally unrelated to the site selection studies currently being undertaken for the national repository.

Further information on the Government’s policy on importation of radioactive waste is provided under the heading *“Waste from other countries”*.

7. Public Consultation on the Site Selection Process

7.1 Phase 1

In June 1992, the then Minister for Primary Industries and Energy, Simon Crean MP, reiterated the Commonwealth Government's commitment to establish a national radioactive waste repository, and announced the commencement of an Australia-wide site selection study to identify a suitable site.

Phase 1 of the study involved the development of the methodology for siting a national repository. The method used computer-based geographic information systems to apply internationally accepted site selection criteria on an Australia-wide basis.

The public discussion paper on Phase 1 of the study, *A Radioactive Waste Repository for Australia: Methods for Choosing the Right Site*, was released on 7 October 1992. Its availability for public comment was advertised in *The Australian*, *Adelaide Advertiser*, *The Canberra Times*, *Northern Territory News*, *Australian Financial Review*, *Sydney Morning Herald* (Newspage Display), *The Mercury* (Hobart), *The Age* and *The West Australian*. Over 1300 copies were distributed for public comment and 124 public submissions were received.

A report summarising and responding to public comment on Phase 1 was published in August 1993. This report was distributed to all people who had expressed an interest in the study.

7.2 Phase 2

Phase 2 of the study involved the application of the site selection methodology developed in Phase 1, taking into consideration public comment on Phase 1, to identify eight broad regions of Australia likely to contain suitable sites.

The Phase 2 discussion paper, *A Radioactive Waste Repository for Australia: Site Selection Study – Phase 2*, was released on 18 July 1994. The discussion paper was advertised in both national and relevant regional papers: *Adelaide Advertiser*, *Australian Financial Review*, *Northern Territory News*, *Sydney Morning Herald*, *The Age* (Melbourne), *The Australian*, *The Canberra Times*, *The Courier Mail* (Brisbane), *The Mercury* (Hobart), *The West Australian*, *Countryman* (WA), *Country Life* (QLD), *Stock Journal* (SA), *The Land* (NSW), *The Weekly Times* (Vic), *Streaky Bay West Coast Sentinel*, *Port Lincoln Times*, *Port Pirie Flinders News*, *Renmark Murray Pioneer*, *Port Augusta Transcontinental*, *Whyalla News*, *Cleve Eyre Peninsula Tribune*, *Alice Springs Central Advocate*, *Katherine Times*, *Tennant and District Times*, *Mount Isa North West Star*, *Charters Towers Northern Miner*, *Longreach Leader*, *Kalgoorlie Miner*, *Bourke Western Herald*, *Broken Hill Barrier Daily*, *Forbes Advocate*, *Parkes Champion Post*, *Ballarat Courier*, *Bendigo Advertiser*, *Mildura Sunraysia Daily*.

Over 1850 copies of the discussion paper were distributed for public comment and 45 public submissions were received. A public report summarising and responding to public comment on Phase 2 was published in November 1995. Copies were provided to people who had submitted comment or expressed an interest in Phases 1 or 2.

7.3 Phase 3 Discussion Paper and Community Consultation

Phase 3 of the study identified the Billa Kalina (central-north) region of South Australia as the preferred area for further detailed investigation based upon a technical comparison of the eight regions identified in Phase 2 and taking into account public comment. A team of consultants from Kinhill Pty Ltd with experience in the area of community consultation were used by the Department, following a tender process, to assist in the development and implementation of a community consultation program for Phase 3.

The discussion paper, *A Radioactive Waste Repository for Australia: Site Selection Study – Phase 3 Regional Assessment* was released on 18 February 1998 along with an information kit. The discussion paper's availability for public comment was advertised in the major daily newspapers, South Australian metropolitan newspapers, the rural press and the following South Australian regional papers; *Streaky Bay West Coast Sentinel*, *Port Lincoln Times*, *Port Pirie Flinders News*, *Renmark Murray Pioneer*, *Port Augusta Transcontinental*, *Whyalla News*, *Cleve Eyre Peninsula Tribune*, as well as the *Cooper Pedy Times* and the *Port Pirie Recorder*. A copy of the advertisement seeking public comment is provided at **Annex D**.

The Phase 3 discussion paper and information kit were sent to key groups representing a wide range of interests in the central-north region of South Australia, landholders, metropolitan and regional media, individuals and groups who had expressed an interest in Phases 1 or 2 of the study. By the closing date for submissions, 30 April 1998, over 2000 copies of the Phase 3 discussion paper and information kit had been distributed. Since the closing date, a further 443 copies of the discussion paper and kit have been distributed.

The aim of the first stage of the Phase 3 public consultation process was to inform people in, or in close proximity to, the identified region about the proposed repository and to listen to people's views on the repository and possible siting options. Key elements of the community consultation process included the operation of a temporary regional information office, community information days, a toll free information line, an Internet web site, meetings with community groups, meetings with stakeholders, establishment of a regional consultative committee involving stakeholders, and use of the media, particularly in the region.

Community-based meetings were held in the week following the release of the Phase 3 discussion paper with:

Andamooka Opal Miners and Progress Association
 District Council of Coober Pedy
 Northern Region Development Board
 Roxby Downs Administrator
 The Corporation of the City of Port Augusta
 The Coober Pedy Times
 WMC (Olympic Dam Corporation) Pty Ltd
 Woomera Administrator and Board

These meetings provided an opportunity to identify other key groups in the community who should be consulted and to discuss the most appropriate mechanisms for promoting and conducting the community information days. Interviews were conducted with the media to inform the public about the project, including the *Coober Pedy Times* and the *Port Augusta Transcontinental* newspapers, the regional ABC radio stations in Port Augusta and Port Pirie, and Channel 9 television in Adelaide.

Consultations on the proposal were undertaken with thirteen lessees in the region whose properties are located in areas likely to meet the site selection criteria. Meetings were held with lessees as soon as possible after the release of the Phase 3 discussion paper to explain the proposal and answer any questions, as well as to identify opportunities and constraints regarding potential site locations.

The regional information office was established in the main street of Port Augusta from 24 February until 17 March 1998. The office was equipped with visual display material, information brochures, the ASSESS system on laptop computer, and people from the project team to discuss the project and answer questions raised by those visiting the office. Approximately twenty people visited the office.

Community information days were widely advertised. Letters were sent to groups in the region informing them of the information days and seeking their assistance in displaying posters. Leaflets were distributed to people living and working in the region. Advertisements were also placed from 6 March 1998 in the *Coober Pedy Times*, *The Gibber Gabber* (Woomera), *Port Augusta Transcontinental* (Port Augusta) and the *Northern Sun* (Roxby Downs). Local newspapers, radio and television stations were provided with articles on the proposal on 3 March 1998 which issued an invitation to people in the region to attend the information days. The information days were held at the following five locations in the region with a total of 275 people attending:

18 March	Roxby Downs	90 attendees, including school students
19 March	Woomera	40 attendees
20 March	Andamooka	13 attendees
24 March	Coober Pedy	115 attendees, including school students
26 March	Port Augusta	17 attendees

After the information days, the regional media was provided with a media brief summarising the public response to the information days, and again inviting people to lodge a written submission.

Up to the closing date for public comment, a total of 123 calls from South Australia and 177 from the other States were received on the toll free information line. A further 91 calls have been received to date requesting information kits and discussion papers. The Internet site registered 498 hits of which approximately 100 callers explored the site further.

In conjunction with community information days, meetings were held with the following community groups in the region:

- Andamooka Land Council
- Andamooka Progress and Opal Miners Association
- Country Women's Association via School of the Air
- District Council of Coober Pedy
- Kupa Piti Kungka Tjuta Aboriginal Corporation
- Nullakarinku Wanga Association
- Port Augusta Native Title Working Group
- Regional Coober Pedy School

The Spencer Gulf Alliance Group was also invited to meet with Commonwealth officers. While the Group declined the invitation, members did attend the community information day held at Port Augusta.

Consultative Committees

A South Australian/Commonwealth Government Consultative Committee has been established to facilitate consultation between the State Government and the Commonwealth Government. The Committee represents the following State agencies:

- Business Investment Branch, Department of Industry and Trade
- Environment Impact Assessment Branch, Department of Transport,
Urban Planning and the Arts
- Industry Services, Department of Environment, Heritage and Aboriginal Affairs
- Department of Premier and Cabinet
- Native Title Unit, Department of Justice
- Radiation Protection Branch, South Australian Health Commission
- Special Projects Mineral Resources, Department of Primary Industries
- State Disaster Committee, Department of Premier and Cabinet

A Regional Consultative Committee (RCC) has been established by the Commonwealth to facilitate information exchange between the Commonwealth and stakeholders in the region. The RCC is not a decision making body, but has been established to ensure stakeholder views are taken into account in decision making. The RCC includes representatives from the following stakeholder groups:

- Andamooka Land Council
- Andamooka Progress and Opal Miners Association

Antakirinja Land Management Aboriginal Corporation
Arid Areas Water Resources Committee
Corporation of the City of Port Augusta
Defence Estate Organisation
Defence Support Centre (Woomera)
District Council of Coober Pedy
Northern Regional Development Board
Flinders Rangers and Outback Tourism Board
Kingoonya District Soil Board
Maree Soil Conservation Board
Marla-Oodnadatta Soil Conservation Board
Municipal Council of Roxby Downs
Outback Areas Community Development Trust
Port Augusta Native Title Working Group
(This group no longer exists, however, the Aboriginal groups which it represented are now represented on the RCC. These groups are the Barngarla, Kokatha and Kuyani)
SA Department of Premier and Cabinet
SA Health Commission
WMC (Olympic Dam Corporation) Pty Ltd
Woomera Board

Guests invited to meetings of the RCC included:

Member for Eyre
Member for Grey

RCC meetings were held on 12 March and 10 June 1998 in Glendambo and Roxby Downs respectively, and further meetings will be held after each stage of investigative drilling. The RCC meetings have enabled personnel working on the national repository project to respond to stakeholders' concerns regarding the project. For example, matters that have been addressed at RCC meetings include; the characteristics of the wastes for disposal in the repository, the handling of wastes, safety matters, the size of the repository and scale of operations, possible impacts on stakeholder interests and matters associated with possible co-location of the long-lived intermediate level radioactive waste store. The meetings have provided a valuable forum for stakeholders' views to be heard and for them to provide relevant information so that the project can proceed taking into account these views.

The community consultation program for Phase 3 is principally focused on the identified region. Once a preferred site is identified, on the basis of detailed field investigations and community consultation, the emphasis will shift to liaison with the immediate community. A local Community Liaison Committee (CLC) will be established to represent local interests around the site. It is likely that some members of the Regional Consultative Committee will also be members of the CLC. This will provide continuity and will allow for wider regional interests to continue to be represented.

Consultation with Aboriginal stakeholder groups

The Commonwealth Government is committed to consultation with Aboriginal stakeholder groups throughout the siting and establishment of a national radioactive waste repository. The region is covered by a number of native title claims. Aboriginal groups with interests in the region have been consulted on the proposal since commencement of Phase 3 of the site selection process, and will continue to be consulted.

Meetings with the following groups were conducted during the initial few months of the consultation, to provide general information about the proposal:

Aboriginal Legal Rights Movement

Andamooka Land Council

Kupti Piti Kungka Tjuta Aboriginal Corporation

Nullakarinku Wanga Association

Port Augusta Native Title Working Group (*This group no longer exists but was composed of members from Barnagarla, Kokotha, and Kuyani claimant groups*)

The Department presented information about the proposal to Aboriginal groups at a number of meetings and prepared detailed written responses to specific questions raised by the groups on the repository proposal.

During consultations with Aboriginal stakeholder groups, the Department emphasised that it wished to minimise the risk of damage to Aboriginal objects, remains, sites of spiritual, archaeological, anthropological or historical significance by the site investigations.

The South Australian Department of the Environment, Heritage and Aboriginal Affairs was consulted concerning requirements under the South Australian *Aboriginal Heritage Act 1988* to minimise the risk of damage to sites of cultural significance. The South Australian register of significant sites was investigated to determine whether any of the sites identified for field investigation were near an officially listed site.

Site inspections by Aboriginal stakeholder groups and other stakeholders have been undertaken at most of the investigative sites. The Government is providing the opportunity for Aboriginal groups to undertake site inspections as part of the process to seek to ensure areas of Aboriginal heritage significance are avoided during field investigations. As a result of the site inspections undertaken to date, some alternative sites have been identified to avoid areas of Aboriginal heritage sensitivity.

8. Summary of Public Comment

8.1 Summary of written submissions

The majority of submissions from the public on the Phase 3 discussion paper were received by 30 April 1998, with extensions granted to 30 June 1998 where requested. A list of respondents to the Phase 3 discussion paper is at **Annex E**.

A total of sixty-nine submissions were received from **eighty-four** respondents (9 submissions had more than one respondent). Of these:

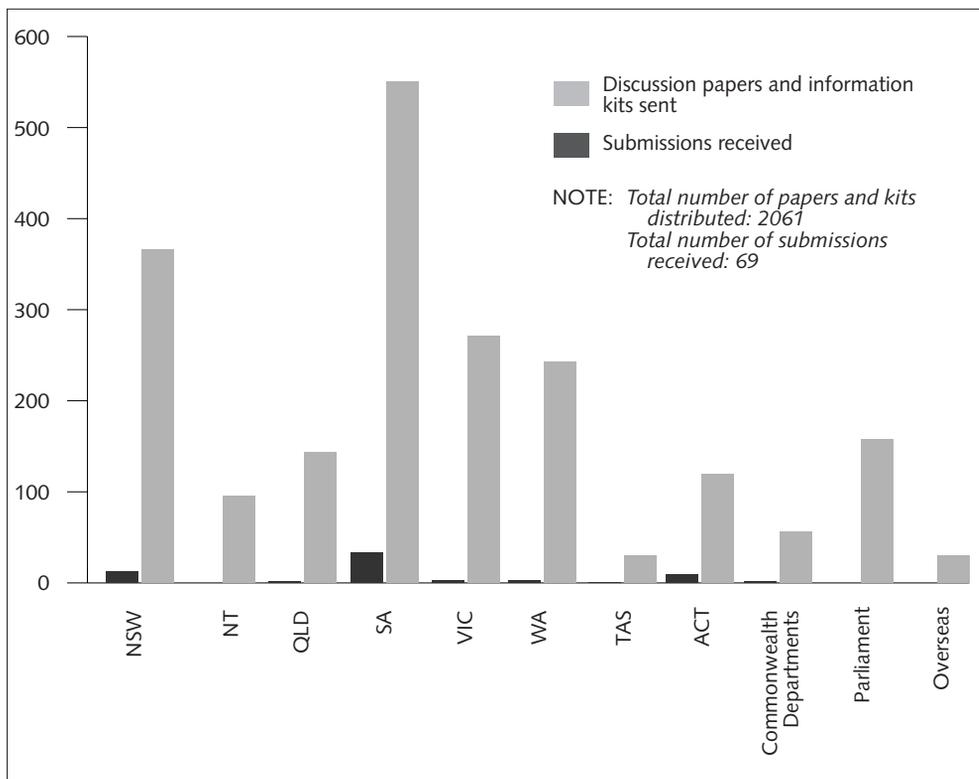
- 21 respondents neither supported nor opposed the proposal but asked questions and made suggestions;
- 14 respondents stated their support for the repository;
- 24 respondents stated their support for the repository and the site selection process;
- 2 respondents stated their support for the repository and the co-location of a store for long-lived intermediate level waste;
- 13 respondents stated their opposition to the repository; and
- 10 respondents stated their opposition to the repository being sited in South Australia or the central-north region.

Up to the closing date for public comment, 30 April 1998, over 2000 copies of the Phase 3 discussion paper had been distributed. This compares with 1850 copies of the Phase 2 report that were distributed (45 submissions were received on the Phase 2 report) and for the Phase 1 discussion paper, 1300 copies were distributed, and 124 submissions received.

Due to the small number of submissions/respondents to the Phase 3 discussion paper, it was considered inappropriate to attempt to provide a detailed statistical analysis of the results or to infer too much from the results. Some simple graphical presentation and descriptive summary of the results is provided below to give an indication of the level and source of interest in the proposal.

Figure 2 shows the total number of Phase 3 discussion papers and information kits distributed to and submissions received from each State and Territory, Commonwealth departments, Parliament House (Members of Parliament and the press) and overseas. The distribution was based on mailing lists for Phases 1 and 2 of the project, contacts obtained through regional consultation and from requests received through the 1800 telephone number advertised on the release of the Phase 3 discussion paper. Over 2000 discussion papers and information kits were sent out up until the closing date for submissions. Of these, 27% were distributed to South Australia compared with 10% in Phase 2 of the project. Of the discussion papers and information kits distributed in Phase 3, most (27%) were distributed in South Australia, compared with Phase 2 of the project where most (18%) were distributed to NSW. Most (48%) of the

Figure 2: Comparison of the number of discussion papers and information kits sent with the number of submissions received for each jurisdiction



submissions on the Phase 3 discussion paper were received from South Australia, followed by NSW (19%), ACT (13%) and WA (9%). In contrast, about 22% of submissions in response to the Phase 2 discussion paper were from South Australia, equal with NSW (22%) and followed by WA (20%), Qld (13%), Vic (9%), NT (7%) and ACT (2%). The increased interest from South Australia may be attributed to the central-north region of South Australia being identified to host the repository and the focus of the consultation program within the region.

Figure 3 shows the number of discussion papers and information kits sent to and submissions received from the main centres in the vicinity of the region, Adelaide and other regional areas in South Australia. The main centres in the vicinity of the region and their respective populations (1996 Census) are Coober Pedy (2762), Port Augusta (13914), Roxby Downs (2446) and Woomera (1349). It should be noted that the number of information kits and discussion papers distributed within each centre includes those sent to mailing list addresses from Phases 1 and 2 of the project, as well as in response to the advertisement on the Phase 3 discussion paper.

A significant proportion of the discussion papers and kits were sent to the South Australian Government.

Figure 3: Number of discussion papers and kits distributed relative to the number of submissions received for regional South Australia

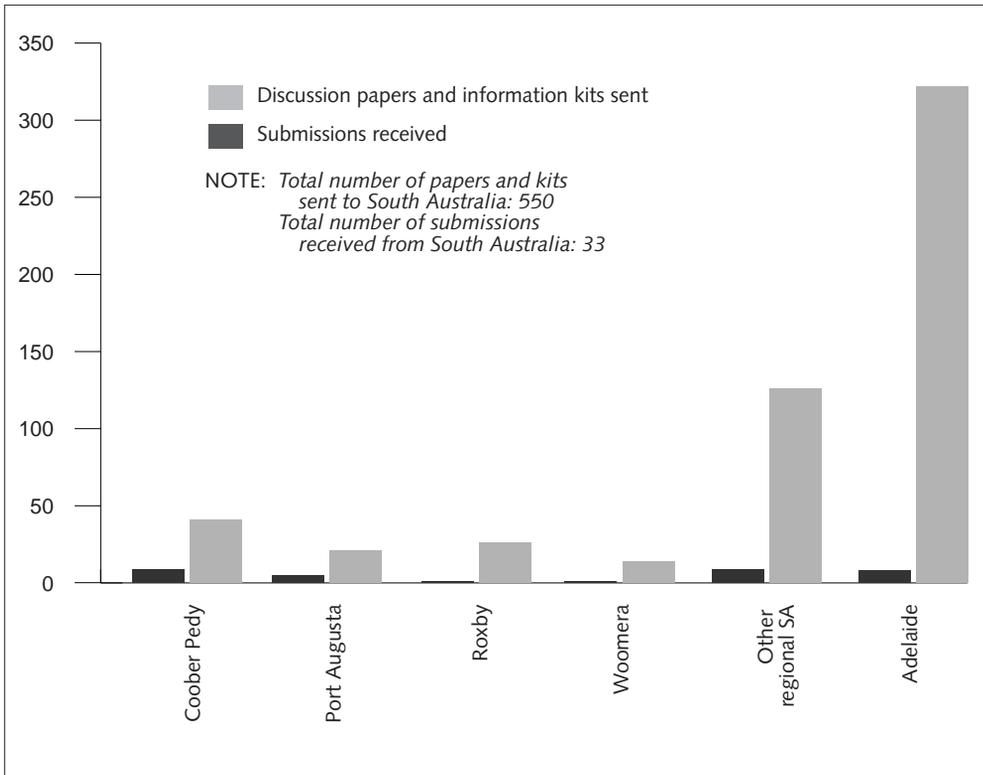


Figure 4 shows the number of respondents to the Phase 3 discussion paper from certain interest groups. The respondents were categorised under the following general interest groups: industry organisations, research bodies, community based groups, environmental groups, government, hospitals and those not associated with any group (individuals). Eighty-four signatures were amongst the 69 submissions. Nine submissions had more than one respondent. For example, four submissions from individuals not associated with any interest group, were signed by a total of 11 individuals. Most (44%) of the respondents to the Phase 3 discussion paper were from individuals not associated with an interest group. Approximately 23% of respondents were involved in research.

Figures 5 and 6 show the variation in the emphasis on the issues raised in submissions from South Australia compared to other jurisdictions. Although the sample size was small, some broad trends can be derived from this comparison. It should be noted that no attempt is made to distinguish between submissions that support or oppose the repository in relation to the issues identified in the graph. Such an analysis was not attempted because the submissions provided general comment on the Phase 3 discussion paper and were not in response to specific questions. Consequently, many submissions did not clearly state their position in relation to the general issues identified.

Figure 4: Interest group response on the Phase 3 discussion paper

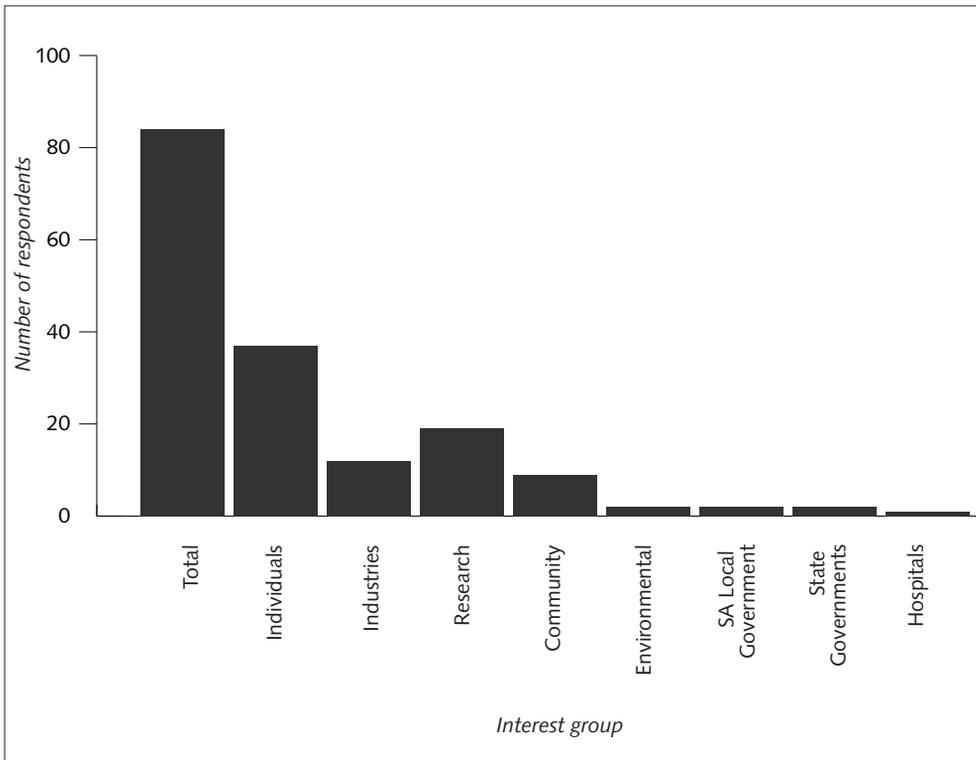


Figure 5 shows that the majority of submissions from South Australia raised matters relating to the impacts the repository and a possible co-located store may have on the region. Most of these submissions were from individuals. For this issue, matters relating to the impact of the facility on public safety and Aboriginal interests were of particular concern. Other subject areas covered by the general issue ‘impacts on the region’ include the environment, the local economy, mining, tourism, agriculture, property values, population and general land use.

Other issues which featured prominently in submissions received from within South Australia were selection of the central-north region of South Australia and facility management. Again most of the submissions from South Australia which raised matters relevant to these issues were from individuals.

Figure 6 shows that the majority of submissions from other jurisdictions raised matters concerning the selection of the central-north region. Most of these submissions were from research organisations. Other matters raised by a significant number of the submissions from other jurisdictions were related to the site selection process, alternative waste management strategies and facility management. Again, in relation to the site selection process, research groups provided most comment. With respect to the other issues identified in **Figure 6**, there was general interest from most groups, including individuals.

Figure 5: Number of submissions received from interest groups in South Australia according to issues raised

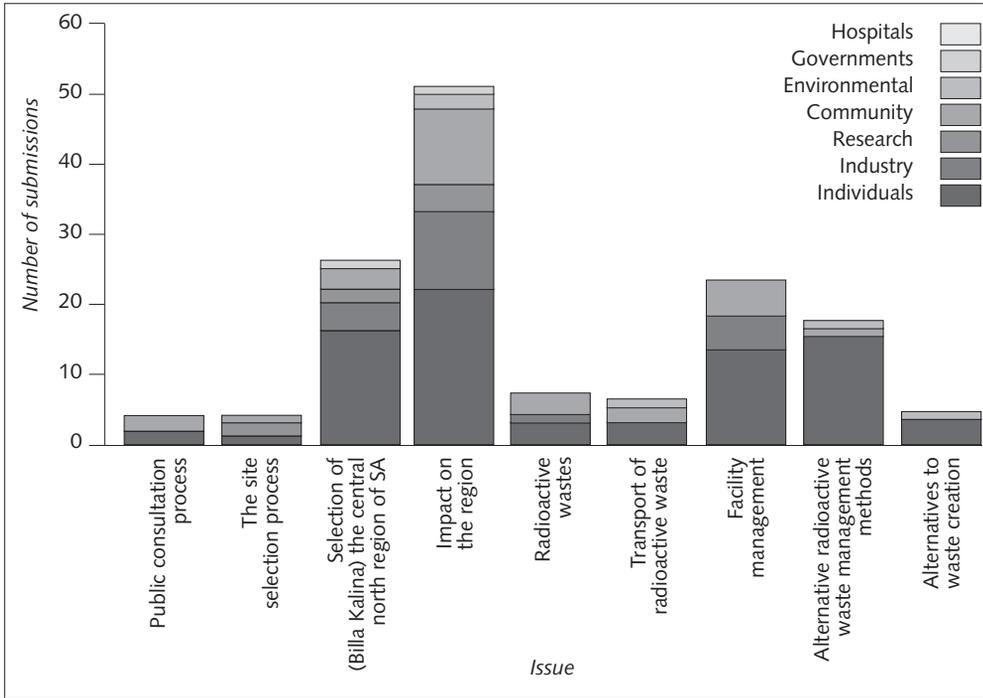
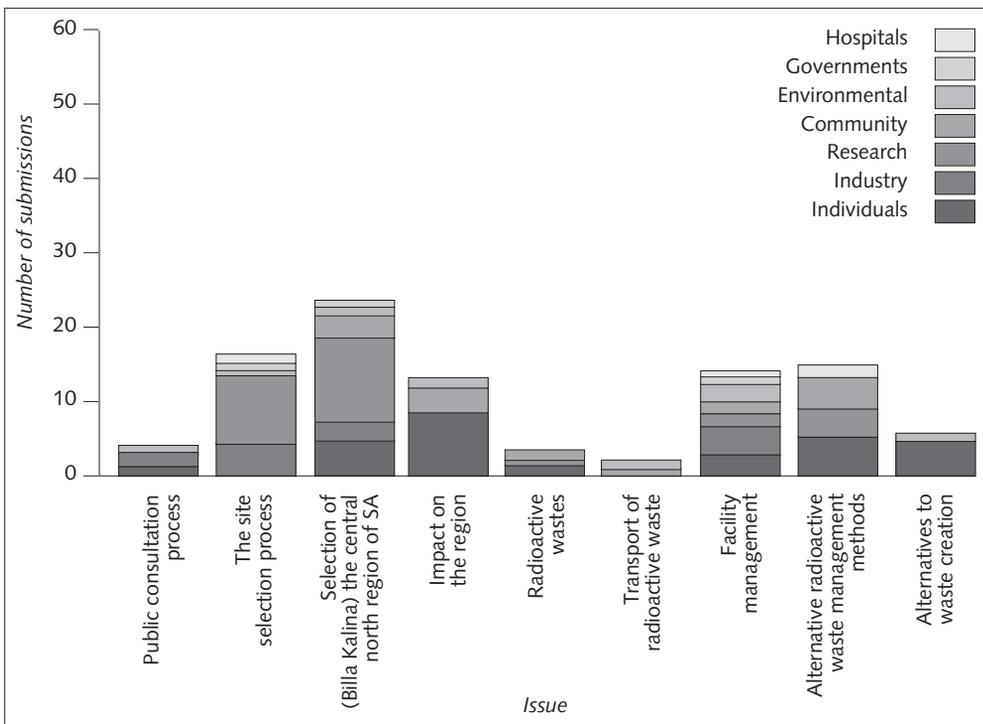


Figure 6: Number of submissions received from interest groups in other jurisdictions according to issues raised



A comparison of **Figures 5 and 6** shows that significantly more individuals from South Australia raised matters concerning the selection of the central-north region compared to individuals from other jurisdictions. While a significant number of the submissions from South Australia raised matters concerning the selection of the central-north region, relatively few commented on the site selection process.

Support

Submissions from people involved in health, research and other uses of radioactive materials generally stated their support for the project, the selection process and the identification of central-north region of South Australia as the region to site the repository. There were some submissions from within the region that stated their support for the project. The need for a national purpose-built facility that provides for safe containment of radioactive material was widely supported by these submissions. A number of submissions commended the public consultation process and the site selection process, in particular the discussion paper and information kit. Questions were raised and/or comments made concerning:

- the site selection criteria, in particular it was suggested that some criteria are too stringent which may suggest a greater risk than actually is the case;
- the origin and type of wastes to be accepted;
- packaging requirements;
- transport arrangements of the waste to the site;
- the total capacity of the facility and its operational period;
- the effect on the local economy;
- the need for continued consultation in the region;
- the number of consultative committees. It was suggested that too many bodies had been formed, and that this would hinder the progress of the project;
- the long-lived intermediate level radioactive waste store, in particular:
 - whether public consultation on the store would take place; and
 - whether the priority should be for the intermediate level waste store rather than the repository;
- ownership of the facility; and
- the costs of using the facility.

Opposition

A number of submissions that stated opposition to the project were against the mining of uranium and viewed the facility as a means of encouraging the use of radioactive substances and hence uranium mining. Submissions that either opposed the project and/or its siting in the central-north region raised objections relating to:

- the region's proximity to the Great Artesian Basin;
- a belief that there would be an effect on bore water used in the region;
- concerns that the facility would impinge on Aboriginal land rights and heritage sites;
- a lack of confidence in the transport and facility safety requirements;
- concerns that there would be a detrimental socioeconomic impact on the region particularly for the tourism, agricultural and opal industries;
- concerns that there would be a compounding effect on South Australia, due to the presence of other nuclear related activities;
- a view that the waste had been generated outside South Australia, and should therefore be disposed elsewhere;
- a view that existing contaminated sites such as mines or Maralinga would provide a more appropriate location;
- concerns that the site may be used for disposal of higher level wastes; and
- concerns that their views were not represented on the consultative committees.

No position stated

The majority of submissions that stated neither support nor opposition to the project were from South Australia. The points raised in these submissions reflected some of the concerns raised by those that supported and opposed the project. Some of these submissions criticised what they perceived as inadequate public notification, because they were not aware of the proposal until too late to put in a more complete submission. They were concerned that their understanding of the project and its impact was incomplete and hence that their submission only reflected their initial reaction towards the project.

8.2 Community Feedback during the Regional Consultation Program

In addition to the written submissions discussed above, a Phase 3 consultation program was implemented in the region, with the assistance of Kinhill Pty Ltd. The details of this program were described earlier in this report. This consultation process provided the opportunity to hear the views of a wide cross section of the community. There were diverse opinions, from people who accepted the prospect of the repository being located in the central-north region through to those who strongly opposed the proposal. Those who were in agreement accepted the need for improved, more responsible management of Australia's radioactive waste. They expressed confidence in the Government's decision-making processes on the repository proposal given the stringent criteria to be applied in selecting a site and managing the repository.

A few people expressed an interest in opportunities for involvement in the construction and ongoing management of the repository.

Others accepted the need for a national radioactive waste repository and acknowledged that the central-north region met all the criteria, but still had concerns about the repository being located in the region. Some thought the region already had its fair share of radioactive waste with the mining at Olympic Dam and as the result of testing of atomic weapons at the former test sites at Maralinga and Emu. Others thought that the case for choosing the central-north region for site selection studies as compared to the Olary region had not been sufficiently proven.

Some people considered it was unfair that the repository be located in South Australia given that most of the waste was generated in the eastern states. They were concerned that South Australia was becoming a centre for activities involving radioactive substances for Australia. Some considered that waste should be stored at the point where it was generated, whereas others questioned why it could not be located on the eastern seaboard of Australia given that repositories were built in wet areas overseas. Others felt that the repository was for the waste generated at Lucas Heights, and therefore should be located in Sydney.

Those most strongly opposed to the proposal had broader concerns about mining uranium, and stated their view that the latter encouraged the use of nuclear energy and contributed to waste and environmental issues world wide.

9. Comments on Matters Raised

A number of themes emerged during the consultation process which people either wanted further information about, expressed concerns about and/or made relevant suggestions. These included the consultation process, the site selection process, selection of the central-north region of South Australia, possible impacts on the region (including public safety, the environment, Aboriginal interests, the local economy, mining, tourism, agriculture, property values, population, general land use, radioactive wastes including wastes to be accepted at the site and those not to be accepted at the site), transport of radioactive waste, radioactive waste management infrastructure, facility management (including its ownership, operation and regulation), alternative waste management methods and alternatives to waste creation.

Several submissions requested detailed information on specific technical matters not directly relevant to the proposal. Where possible these have been addressed. However, further information can be obtained by referring to the references in the bibliography at the end of this publication, or by writing to the Information Officer, National Near-Surface Radioactive Waste Repository Project, Department of Industry, Science and Resources, GPO Box 9839, Canberra ACT 2601.

Comments in response to the above concerns raised by respondents are provided below.

9.1 Public Consultation Process

Time available for written comment on the Phase 3 discussion paper

Concern was raised in some submissions and during the regional consultations that there was not enough time to respond to the Phase 3 discussion paper before the closing date for comment.

The formal public comment process involving deadlines for receiving public submissions on public reports is aimed at facilitating early consideration of issues to assist in the planning of the next study phase. However, comments received outside the formal process will continue to be taken into consideration during the siting studies involved in identifying a preferred site and two alternatives. In addition, further opportunity for public review of the proposal will be provided once a preferred site is identified, and a detailed proposal is developed for environmental assessment.

Focus of the public consultation program

Several submissions raised concern that the public consultation process for the national repository project was not being sufficiently targeted to the central-north region of South Australia. This concern was also raised during regional consultations. Other submissions commended the public consultation program being undertaken by the Government.

The Government is committed to consultation throughout the siting and establishment of a national repository and on the possibility of a co-located long-lived intermediate level radioactive waste store. Accordingly, as the study narrows, the consultation program has been focused to ensure that information is made available to key stakeholder groups. Potential stakeholders have been given an opportunity to have their say, and to obtain answers to their questions on matters relating to the proposal.

To date, the public consultation process for the national repository has been undertaken in three phases.

The communication approach adopted for Phase 1 of the repository siting study was to inform the Australian community at large about the proposal, and to seek public comment on the method for selecting a suitable site. Consultation was at a national level and the Phase 1 discussion paper was advertised in major Australian newspapers.

In Phase 2 of the study, greater emphasis was placed on consultation in the eight broad regions identified in the Phase 2 discussion paper. Reports were distributed to local councils in and around the vicinity of the eight regions, and advertising was through the rural press and in regional papers as well as in major Australian newspapers.

Consultation during Phase 3 of the study is being focused in and around the central-north region of South Australia, although information has also been disseminated nationally. The Phase 3 discussion paper identifying the region for further study was advertised in local papers and South Australian regional papers, as well as major Australian newspapers. Community information days and various community meetings have been held to facilitate the discussion on issues and the exchange of information with people who have an interest in the region. More detailed information on the consultation process to date is provided under the heading “Public Consultation on the Site Selection Process to Date”.

Most public interest and the majority of public submissions on Phase 3 were generated at the regional and local levels. With the identification of sites for field investigations in the region, the Government’s consultation program has become more locally focused with potential stakeholders being consulted regularly on matters relating to the site selection process. Once a preferred site is identified, a local consultative committee will be established involving key stakeholders to enable them to be kept informed, and have input on matters relating to the proposal.

While the Government consultation program is expected to become more locally focused as the number of sites under investigation is narrowed, consultation will continue at the regional, State and national levels.

The consultation process is ongoing and flexible, and any recommendations on increasing its potential effectiveness will continue to be taken into account. Once a preferred site is identified for the national repository and possible co-located store, consultation will continue as part of the environmental assessment process, as well as during preparation and implementation of the operational and management plans for the site.

9.2 The Site Identification Process

Concern was raised that the proposed timetable for the siting and establishment of the repository was too short for adequate study and that it is vital to have all necessary information to assess Australia's future involvement with radioactive waste. Other submissions commended or were supportive of the site selection process.

The time line for siting and establishment of the national radioactive waste repository provided in the Phase 3 discussion paper is a guide indicating the time required for the various elements of the project. The Government's priority is to ensure that the project is conducted appropriately, with due attention to technical and community consultation considerations, in order to obtain the best outcome for all Australians. Accordingly, the Government recognises the need to maintain flexibility to address any issues that may arise in relation to the proposal and provide ample time for stakeholder consultation.

Detailed regional baseline studies will be undertaken during the site selection process to assist in a comparison of regional environmental data on the existing environment with site specific data. These studies will ensure that any area of special environmental significance can be avoided.

Before a final decision can be made on the siting and establishment of a national repository and possible co-located long-lived intermediate level radioactive waste store, relevant statutory processes will need to be followed and taken into account by the Government. In particular, it is expected that environmental assessment of the proposal will be required under the Commonwealth's *Environment Protection (Impact of Proposals) Act 1974*. Environmental assessment typically involves an environmental impact and safety assessment of the detailed proposal, a public review period, and consideration of and response to public comment on the proposal.

The feedback received during the Phase 3 community consultation process will be taken into account in developing the detailed proposal for the national repository and possible co-located store. This feedback will also assist in setting the scope of an environment and social impact assessment by highlighting issues of community concern which will require further examination. Another review process involves the licensing of the facilities by the relevant regulatory body. Further information on environmental impact studies is provided under the subheading "Environment".

The Government monitors, and participates in research contributing to international developments in the field of radioactive waste management. The national radioactive waste management strategy takes into account current international standards and international scientific and inter-governmental consensus on appropriate radioactive waste management methods, as well as Australia's particular circumstances.

9.3 Selection of the Central-North Region (Billa Kalina) of South Australia

A number of submissions asked why the central-north region of South Australia had been selected. Some submissions expressed opposition to the region's selection, while others supported its selection either on the basis of the selection criteria or in general terms.

The central-north region of South Australia was identified for further investigation because it offered the largest area of possible suitable sites for the near-surface repository. The determination of the region as most suitable of the eight regions identified in Phase 2 of the project, is based on descriptive comparisons and technical assessment of the eight regions, using the computer based information system, ASSESS (A System for Selecting Suitable Sites), against the thirteen National Health and Medical Research Council (NHMRC) selection criteria. These criteria are based on international siting criteria and cover both biophysical and socio-economic aspects of the regions. Specific concerns raised regarding these criteria are addressed below.

Water and climate

Several submissions were concerned that although the central-north region of South Australia appeared arid, the assessment process had not taken into account the proximity of the region to the Great Artesian Basin and the infrequent but often heavy rainfall of the area and the effect of this rainfall on ground water movement.

Questions were raised as to whether ground water would be affected and whether ground water movement could result in movement of radioactive material to the Lake Eyre or Adelaide catchment area. Questions were raised regarding assessment of ground water gradients, and the effect on artesian bores in the region. Issues relating to climate change were also raised.

The central-north region overlaps with a small segment of the Great Artesian Basin as the region's boundary is based on the standard map sheet boundary which contains a portion of the basin. The area overlapping the Great Artesian Basin was not considered as a possible area in which to locate sites for the repository due to the presence of non-saline water in parts of the Basin. The sites identified for further investigation are located west of Lake Torrens and well away from the Great Artesian Basin.

Impact on ground water resources is a key consideration for site appraisal. A site will be considered where ground water conditions can be effectively modelled. The regional data used to this point will be checked at a more local level through studying the results of the investigative drilling of up to 18 sites and subsequently, through an environmental assessment of the preferred site and two alternative sites. Additional information provided by these studies will be used to ensure any shortcomings in site characteristics will be compensated by design and operational features of the facility.

The region has a median annual rainfall of about 200mm. Some areas within the central-north region of South Australia are unsuitable due to their susceptibility to flooding, however, none of the sites identified for investigation are located within these areas. All relevant sites are located on elevated tablelands, where surface run-off and evaporation rates are such that surface water does not accumulate and contribution to the regional aquifer system is minimal.

A preferred site is one where the water table is deep, with poor water quality and very low supply rates. For a site to be considered, the water table must be at least five metres below the base of the repository. High suitability was deemed where the ground water was at least 50 metres below the surface and where water production was less than 0.5 litres per second. Regional scale interpretation of ground water characteristics is possible for the central-north region of South Australia because sufficiently detailed water bore information is available. Studies of water bore records have provided site-specific indications of the standing water level, water quality and the supply rate throughout the region. The region has areas with deep, low production and saline ground water systems. In some parts of the region the standing ground water level is deeper than 75 metres; the water supply is low (almost 0.1 litres per second) and water quality is poor (total dissolved solids of greater than 14,000 parts per million). No beneficial use relates to waters with a salt or mineral content such that it is unsuitable for humans or agriculture and difficult to use for mining. In addition, any natural deficiencies in a preferred site can be compensated for through the use of engineered structures to safeguard against unacceptable release of radionuclides into the environment.

The near-surface repository will be designed and sited to isolate the waste from the environment for about 100-300 years following closure of the facility. During this period access will be restricted and a program of environmental monitoring carried out. By the end of this period the radioactivity of the waste in the repository will have decayed to levels at which there is no further need to restrict access to the site. Impact on the environment is also limited by the restrictions on the type of wastes accepted for disposal.

An above-ground store for long-lived intermediate level waste would be designed and operated to ensure any release of radionuclides into the environment will be minimal and certainly within the limits established by the relevant regulatory authority.

Hydrology

One submission was concerned that insufficient detail was known about radionuclide migration times. In another, the Lake Frome Basin was suggested as a suitable location for the repository based on the hydrological qualities of the area.

Radionuclides, like all chemical species, are retarded in soil and move more slowly than infiltrating water. There is general knowledge of the rate of movement of radionuclides through soils based on published data from many locations around the world. During site characterisation, drill samples from the identified sites will be collected during the drilling program and the sorption properties of the samples measured. The soil water properties of the site will also be measured. These measurements on samples from the site will provide data on migration rates of radionuclides in the ground beneath the proposed repository. Information on migration rates of radionuclides will be used in the safety assessment to determine the potential impact should any radionuclides be released from the repository. This site information will provide a basis for assessing the safety of the proposed repository.

The central-north region of South Australia has an annual pan evaporation rate that is over nine times the average annual rainfall. This means that the downward flow of infiltrating rainwater in the sites being investigated is small. Recharge to ground water from rainfall in arid regions like central-north South Australia is very small. It is estimated that long-term average recharge to ground water in the region is 1 millimetre/year or less. This means that it takes between 2,000 and 5,000 years for infiltrating water to travel through 50 metres of unsaturated zone. Once the infiltrating water reaches the water table, it then takes several thousand years before it discharges into one of the salt lakes of the region. Travel times on the longer east-west ground water flow lines are measured in tens of thousands of years. Since any released radionuclides from the repository will travel more slowly than water, the radionuclide travel times in the ground will be extremely long, much longer than the decay times for the radionuclides. These studies along with examination of the soil structure and clay absorption characteristics are necessary to understand the environmental impact of the repository and to ensure integrity of containment can be maintained.

The Lake Frome Basin location was assessed to be less suitable than the central-north region of South Australia for the following reasons:

- It is situated over the margin of the Great Artesian Basin in an area with aquifers varying from high to low productivity; some of which have artesian flow;
- the main aquifers have water quality suitable for stock watering;
- public road access is of low quality and distant from main highways; and
- Lake Frome itself is a Regional Reserve and abuts the Gammon Ranges National Park, and as such has constraints placed upon it for land use and associated impacts.

Geology

One submission wanted to know how the geochemical properties of the site would be established. In another, the Lake Frome basin was suggested as a suitable location for the repository based on the tectonic qualities of the area.

The drilling program at the identified sites will provide samples of the soil and weathered materials below the ground surface. These samples will be used to measure the geochemical properties of the rock.

Water samples from the ground water will provide information on ground water properties beneath the sites identified for field investigation. The investigative drilling of the sites will also provide information on the geology and any mineral potential. The sites were identified in part because of the geological formations which occur there.

Refer to comments above under the heading “Hydrology” on why Lake Frome Basin was less suitable than the central-north region of South Australia.

Seismic activity

Two submissions requested further information on the seismic history of the area and how any seismic activity would affect the facility.

The central-north region does not have a recorded history of significant seismic activity. There are records of small earthquakes and tremors on the Lake Torrens fault zone to the east of the region. The age and simple structure in the rocks at the sites indicates that the area has been stable for millions of years.

To be prepared for the unlikely event of an earthquake, the design of the repository and a possible co-located store, will be required to exceed the Australian earthquake standards both during operations and after closure. The effect of earthquakes will be considered in the environmental and safety assessments required before a licence is issued to construct and operate the repository or a long-lived intermediate level radioactive waste store.

A contingency plan is required for events such as earthquakes as part of licensing a repository and a possible co-located store. The plan will address action to be taken in the unlikely event of a breach of the facility’s integrity or waste packaging.

The contingency plan would also include the steps to be taken if an earthquake occurred during operations or following closure during the period of restricted access and monitoring for the repository (100-300 years). Based on monitoring information, a decision would be made on whether any packages should be retrieved for examination and reburied. Following closure and after the period of restricted access and monitoring had elapsed the radioactivity within the repository will have decayed to low enough levels that there would be no need for any action.

Transport infrastructure and population

One submission considered that substantial road construction would be necessary to ensure the site is located at a substantial distance from populated areas. Several other submissions suggested that the distance from population centres suggested that the risks associated with the repository are greater than they actually are.

It is very desirable that the repository has good access. Highest suitability was assigned to areas within 10 kilometres of a well formed major road or rail line to minimise the requirement for substantial road construction and associated costs.

The criterion for siting the repository away from areas of high population aims to minimise the likelihood that the site would be required for other purposes and to minimise the risk associated with human intrusion.

9.4 Impact on the Region

Public safety

Cumulative effects

Several submissions were concerned that the South Australian outback region was subject to radioactivity from Olympic Dam tailings and Maralinga, and that the national radioactive waste repository and a long-lived intermediate level waste storage facility would compound the situation.

The siting of a national repository and long-lived intermediate level waste store in the central-north region of South Australia would not contribute to a higher level of background radiation in the region, than would otherwise be encountered in the region.

No members of the general public will be subject to any additional radiation above normal background levels as a result of operation of the repository or a store for long-lived intermediate level radioactive waste. Environment and safety management plans developed for the repository and a possible store as part of the environmental assessment process would be subject to review through the licensing processes. The plans will involve an ongoing monitoring and maintenance program to ensure radioactivity is contained on site.

The safety of workers at the site and protection of the environment will be addressed by management plans for the site as required and approved by the relevant regulatory authority, expected to be the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) which is an agency of the Commonwealth Department of Health and Aged Care (**Information Box No. 2**). The plans will address operational aspects of radiation safety such as personnel training, personnel monitoring, record maintenance, monitoring within the operational area of the facility, designation of potentially hazardous areas, emergency preparedness, contamination control, and

protective clothing and apparatus. The plans would be reviewed regularly by the operator and the relevant regulatory authority and made available to the public.

Following closure of the facility, the radioactivity of materials in the near-surface repository will decay to within safe levels within a period of restricted access and monitoring to be determined by the regulator. This period would be between 100 to 300 years depending on repository design, waste acceptance criteria and operational factors. The repository and its design, involving engineered and natural barriers, will provide for containment of radionuclides on site during its operational period and well into the future. An intermediate level radioactive waste store would require a purpose-built shielded facility designed and operated to minimise radiation exposure to workers and the environment.

Information Box No.2 *Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)*

ARPANSA was established under the *Australian Radiation Protection and Nuclear Safety Act 1998* (Commonwealth) to:

- regulate Commonwealth dealings with radiation sources and nuclear facilities;
- promote uniformity of radiation protection and nuclear safety policy and practices across jurisdictions of the Commonwealth, States and the Territories;
- provide advice on radiation protection, nuclear safety and related issues;
- undertake research and provide services in relation to radiation protection, nuclear safety and related issues; and
- to perform other such functions as set out in the legislation.

ARPANSA is empowered to license, audit and transparently regulate radiation, health and safety relating to Commonwealth activities. ARPANSA will issue Commonwealth entities with licences in respect of radioactive material, radiation apparatus and nuclear and other facilities, including a radioactive waste disposal or storage facility. Attached to each licence will be a series of conditions. It will be an offence under the legislation for a controlled person to deal with controlled materials, apparatus or nuclear and other facilities without a licence or contrary to the licence conditions. Penalties will apply to breaches of the act, regulations and licence conditions.

The legislation provides for the establishment of an independent advisory body - the Radiation Health and Safety Advisory Council. Members of this Council will be appointed by the Minister for Health and will include representatives from the community, the State and Territory Governments as well as others with appropriate experience. Each member will be appointed on the basis of their standing and their expertise in fields relevant to radiation protection. The Council will oversee the work of a number of standing committees. The standing committees will also comprise experts in the field, together with community and public interest groups.

Acceptable risks

There was dissatisfaction with use of the term ‘no unacceptable risk or detriment’ in the Code of practice for the near-surface disposal of radioactive waste in Australia (1992) to describe the safety of a repository for humans and the environment because it indicates that there will be a level of risk and detriment. One submission considered that there was excessive reliance on Codes of Practice and International Atomic Energy Agency (IAEA) guidelines in the Phase 3 discussion paper. Questions were also raised as to how views on what is an unacceptable risk may change in the future.

The phrase ‘no unacceptable risk or detriment to humans or the environment’ is used because with any activity where human health and safety is a concern, there is a level of risk involved. To say there is **no** risk involved with such activities would be misleading. International and national environment protection and human health and safety guidelines aim to minimise the risk to an ‘acceptable’ level. ‘Acceptable’ meaning that no person nor the environment would be subject to radioactivity above established regulatory limits.

The national Codes of Practice referred to in the Phase 3 discussion paper and in this report are based on national and international radiation protection standards and recommendations such as those developed by the National Health and Medical Research Council (NHMRC), the International Commission on Radiological Protection (ICRP) and the International Atomic Energy Agency (IAEA) (**Information Box No. 3**). Australia participates directly in the development of IAEA guidelines and safety standards. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) was established, in early 1999, to regulate Commonwealth activities with respect to radiation health and safety. ARPANSA, in consultation with State and Territory Governments, is responsible for developing and updating national standards, taking into account international standards, for the safe management of radioactive waste in Australia.

Information Box No.3 *The International Atomic Energy Agency (IAEA)*

The International Atomic Energy Agency (IAEA) is an autonomous inter-governmental organisation founded in 1957 in accordance with a decision of the General Assembly of the United Nations. The IAEA is an agency of the United Nations. Its activities include harmonisation of principles and standards for the safe management and disposal of radioactive waste, advisory services, assistance to Member States and the co-ordination of research and development and special projects that have regional or global interest. Almost eighty percent of the IAEA's 127 Member States do not have nuclear power programs and use radionuclides principally for research, medical, industrial and agricultural applications.

The IAEA safety standards are substantiated by findings on radiation levels and effects estimated by the United Nations Scientific Committee on the Effects of Atomic Radiation. They are primarily based on recommendations of the International Commission on Radiological Protection (ICRP), a non-governmental scientific organisation founded in 1928, and the International Nuclear Safety Advisory Group (INSAG), an independent group of experts founded in 1985 which, under IAEA auspices, elaborates nuclear safety principles.

The IAEA provides detailed guidance in all areas of radioactive waste management for member states that have sought international guidance and coordination in the field of radioactive waste management. Continual development and promulgation of the Radioactive Waste Safety Standards (RADWASS) is a key activity of the Agency.

The IAEA was also responsible for coordinating the development of the international *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. Further information on the Joint Convention is provided at **Information Box No. 5**.

Radiation exposure levels

Comparison of exposure levels set by the National Health and Medical Research Council (NHMRC) based on the ICRP recommendation of 1mSv/year compared to levels in the UK, Germany and the United States was also raised. Another submission asked what was the estimated limit on total site radioactivity and how did this correspond to radiation dose limits on site workers.

Unlike Australia, countries such as the UK, Germany and the US have highly developed nuclear power industries, and therefore dose constraints for a single facility are established on the premise that a member of the public may be exposed to more than one source. The National Health and Medical Research Council (NHMRC) limit of 1 milliSievert per year is a total dose to the public from manufactured sources, and facilities such as the repository, store or research reactor, but excludes medical and natural

background exposure. Hence the *Code of practice for the near-surface disposal of radioactive waste in Australia (1992)* requires use of a dose constraint, which involves regulators taking into account sources of exposure other than the repository. In practice, this could result in a reduction in the activity concentration limits for waste to be disposed of or stored at a specific facility, to take account of other potential sources of radiological exposure. The value for the dose constraint will depend on the characteristics of the preferred site and would be set by the relevant regulatory authority.

Environment

Some submissions suggested that the study has overlooked wilderness related values of outback South Australia. Others raised concerns regarding the impact of the repository on the region's environment, and the need to carry out a thorough environmental assessment for the repository.

Selection criterion j states that *the site should not be in an area that has special environmental attraction or appeal, that is of notable ecological significance, or that is the known habitat of rare fauna or flora.*

The selection of the central-north region of South Australia for study to site a national radioactive waste repository, does not imply that the region has been assessed as having no areas of special environmental attraction or appeal, ecological significance or rare flora or fauna habitat.

The Australian Heritage Commission's Register of the National Estate was used to assist in assessment of the central-north region against this criterion. The register is updated regularly to include interim or proposed estate areas that are deemed to warrant registration. The central-north region, like other regions examined, has large areas outside those which are currently identified as significant in terms of lands with nature conservation or heritage status. The small size of the site required for a repository and possible store will also contribute to enabling a suitable site to be found away from areas of special environmental attraction or appeal and ecological significance.

Detailed regional baseline studies will be undertaken during the site selection process to assist in a comparison of regional environmental data with site specific environmental data. These studies will ensure that any area containing rare flora or fauna, or an area of special environmental attraction or appeal, or that is of notable ecological significance can be avoided.

After a preferred site has been identified, site-specific surveys of the flora and fauna and other environmental factors will be undertaken as part of the environmental impact assessment. The studies will be undertaken by agencies with appropriate knowledge and expertise in environmental surveying. A thorough assessment of the impact of the repository and a possible co-located store on the environment will form part of the environment assessment of the proposal.

Aboriginal interests

Several submissions suggested that selection of the region implied that the region was considered a 'wasteland', 'sacrifice zone' and disregarded the interests of indigenous people in the region. Particular concern was expressed for the rights of indigenous people and their claims on the region.

Site selection criterion k states that *the site should not be located in an area of special cultural or historical significance.*

The selection of the central-north region of South Australia for site selection studies does not imply that it has been assessed as having no areas of cultural or heritage significance. The region is covered by a number of native title claims and contains areas of heritage significance. However, the region like other regions examined, has large areas outside those which are currently identified as significant in terms of lands with nature conservation or heritage status.

The Australian Heritage Commission's Register of the National Estate was used to assist in assessment of the central-north region against criterion k. The register is updated regularly to include interim or proposed estate areas that are deemed to warrant registration. However, it was recognised that detailed field investigations and consultation with stakeholders, including Aboriginal stakeholder groups, at the regional level would be required to ensure that this criterion is met.

After the region was announced for siting studies for the national radioactive waste repository, consultation commenced with Aboriginal stakeholder groups and other regional stakeholders. The South Australian register of significant sites has been consulted, and site inspections involving anthropological and archaeological assessment have been conducted by Aboriginal stakeholder groups. Some alternative sites have been identified to avoid sites of Aboriginal heritage significance. Aboriginal groups with an interest in the areas under investigation will continue to be consulted throughout the site selection process and all efforts will be taken to avoid areas of Aboriginal heritage significance. Further information on the Aboriginal consultation process is provided under the heading "Consultation with Aboriginal stakeholder groups".

The local economy

One submission stated that there was a local body of support for the establishment of the repository for local economic reasons.

Some minor economic benefits will arise especially during facility construction and disposal/storage operations. Some upgrade of existing infrastructure may be required depending on the location of the preferred repository site. However, it should be noted that due to the small amount of radioactive waste generated in Australia the repository and possible co-located store will be small and require only minimal staffing.

Mining

Some submissions were concerned about the impact of the repository on opal mining in the region and the impact of mines on the safety and operation of the facility.

Site selection criterion h states that *the site for the facility should be located in a region that has no known significant natural resources, including potentially valuable mineral deposits.*

National and regional databases were used to assess areas against this criterion before the selection of the region and investigative sites. The known and potential economic mineral deposits were reviewed both at the national and the regional scales using the Australian Geological Survey Organisation's (AGSO) mineral location and mineral resource data sets in Phase 2 of the study. This information provides a general representation of the mineral occurrences in the regions, but a more detailed investigation of the preferred areas' mineral potential will be done before a preferred site is identified. Investigative drilling of the preferred site will provide further information on the mineral potential of the site.

Before drilling of the investigative sites begins, the Commonwealth will advise any holders of exploration licenses, mining leases and precious stones claims in the area of the sites, of the nature and purpose of the work to be undertaken. Any new information gathered relating to the mineral potential of the area will be taken into consideration in the identification of a preferred site.

Although mineral potential will be investigated at the boundary of the site to ensure the area does not overlap an area of economic interest, there is no reason why mining could not safely take place in close proximity to the buffer zone surrounding the repository.

Tourism

A number of submissions were concerned that the repository would adversely affect the area's tourism industry. One submission was concerned that it might interfere with access to the region by tourists. Another submission suggested a long term promotional campaign would be required to counter negative perceptions of the area as a tourist destination resulting from siting the repository in the region.

A national radioactive waste repository and a possible co-located intermediate level radioactive waste store is unlikely to have significant impact on the aesthetics of the region or the movement of tourists within the region. In addition, the presence of the facility would not present a significant health and safety risk to members of the general public.

The total site area will be approximately 2.25 square kilometres with the facility being surrounded by a large buffer zone within this area. Transport of radioactive waste to the facility is expected to be infrequent and would be unlikely to interfere with use of public transport routes within the region.

Some sites under investigation are located either on the Woomera Prohibited Area or the Nurrungar Prohibited Area, where access by the public is restricted.

The Department of Industry, Science and Resources will work to further inform the public through the environmental assessment process, about the repository and a possible co-located store, to minimise any negative perceptions of the area as a result of the siting of the facility. The regional and local consultative committees established as part of the Phase 3 community consultation process will provide a forum to discuss such concerns and ways in which they may be addressed.

Agriculture

Several submissions were concerned that the siting of the repository on or near their pastoral lease would affect the marketability of their product because of the perceived effect the repository may have on their 'clean green' image.

As stated above, the Department of Industry, Science and Resources will work to further inform the public through the environmental assessment process, about the repository and a possible co-located store, to minimise any negative perceptions of the area as a result of the siting of the facility. The regional and local consultative committees established as part of the Phase 3 community consultation process will provide a forum to discuss such concerns and ways in which they may be addressed.

All the sites identified for further investigation for the repository are located on pastoral leases. It is likely that the repository site will be excised from a pastoral lease by the Commonwealth. Stringent regulation of activities at the site would mean that the impact on the region's environment, stock and human health and safety would be minimal.

Property values

Some submissions were concerned that property values, including the resale value of pastoral leases, would be adversely affected by the siting of the repository in the region. One indicated that just compensation would be expected for any incurred losses.

As it is highly unlikely that there would be any safety or environmental impact of the repository outside the facility's buffer zone, there should be no significant impact on the market values of the surrounding properties. However, the Commonwealth will address the issue of compensation with respect to any properties likely to be directly affected by the repository site, for example the pastoral lease on which the repository is sited, if the need arises. It is likely that the area required for the repository and store will need to be excised from a pastoral lease.

As stated above, the Department of Industry, Science and Resources will work to further inform the public through the environmental assessment process, about the

repository and a possible co-located store, to minimise any negative perceptions of the area as a result of the siting of the facility. The regional and local consultative committees established as part of the Phase 3 community consultation process will provide a forum to discuss such concerns and ways in which they may be addressed.

Population

Two submissions expressed concern at the proximity of the repository to residents of the area.

The region being considered for siting the 2.25 square kilometre area needed for the repository and possible co-located store, is over 67,000 square kilometres. A large buffer zone surrounding the facility within this 2.25 square kilometre area will act to ensure the integrity of the site is maintained and that there is no significant adverse health or safety impact on the local population or environmental impact on neighbouring properties. In addition, the repository will be sited at least 5 kilometres from the nearest population centre.

General land use

Criticism was made of the application of site selection criterion h the site for the facility should be located in a region that has no known significant natural resources, including potentially valuable mineral deposits, and that has little or no potential for agriculture or outdoor recreational use to the central-north region of SA. There was some question as to whether the transportation of wastes would limit land use and the potential danger posed by activities at the Woomera Rocket Range.

The use of the term 'region' under criterion h is intended to mean in the general vicinity or area of the repository site. All investigative sites within the central-north region were identified, taking into account criterion h, on the basis of available data and preliminary field investigations.

The Register of the National Estate was used to assist in the identification of nature conservation reserves, towns, homesteads and related infrastructure. The Lake Eyre national park is over 200 kilometres from the nearest investigative site.

The known and potential mineral deposits were determined using a general representation of mineral location and mineral resource data sets for the region. A more detailed assessment will be carried out at each of the identified investigative sites in the drilling phase of the study.

The main agricultural activity of the region is rangeland grazing, with low stock density. All investigative sites are located in areas with low production and deep, poor quality ground water systems and are therefore unlikely to be used for intensive agriculture.

Transport of radioactive waste is unlikely to limit land use in the vicinity of transport routes as transport of wastes is expected to be infrequent, due to the small quantities

generated. Wastes will be transported in accordance with stringent safety requirements. For further information refer to the response provided under the heading “Transport of Radioactive Waste”.

The facility would be located to ensure that any danger presented by activities at the Woomera Rocket Range and any impact of the facility on the Range would be minimised. In the extremely unlikely event of a rocket or a plane landing on the near-surface repository or a possible co-located above-ground store for intermediate level waste, there would be no significant environmental or health impact outside the buffer zone attributable to the presence of the facilities.

Plans for operations and remedial action in the event of an incident would be in place for both the store and the repository. Any material dispersed within the buffer zone could easily be detected. Low and short-lived intermediate level radioactive wastes would be handled and re-consigned to the facility in accordance with stringent regulatory requirements. A possible co-located above-ground store for intermediate level waste would be designed to minimise the impact of such incidents.

9.5 Radioactive Wastes

Characteristics of waste and management strategy

A number of submissions raised questions regarding the radioactive properties, form and packaging of the existing and future wastes destined for the repository and store. Particular concern was raised that metal drums used for storage would corrode in the proposed environment.

Over time, radioactive material loses its radioactivity. Most of the radioactive material disposed of in the repository will lose much of its radioactivity over about 30 years. After about 100-300 years following closure of the repository, access to the site will no longer need to be restricted. The waste which would be held in the above-ground store is more radioactive than that which will be disposed of in the near-surface repository.

Only solid wastes will be accepted at the national repository and the long-lived intermediate level radioactive waste store. The wastes will be packaged in accordance with stringent safety standards for the transport of the waste to the facility. The repository operator will also develop criteria on how waste must be packaged for acceptance at the repository. This will depend on the design of the repository and the conditions imposed by the facility licence. Whether or not steel drums will be accepted will depend on the barriers installed as part of the repository design and the likelihood of radionuclides being transported from the emplaced wastes. The safety assessment will assume that steel drums could corrode soon after emplacement and assess the risk to humans and the environment as if the steel drums provide no containment. Further information on design and packaging is provided below under the subheading “Repository design”.

All radioactive waste is classified into categories based on how much radiation it emits, and the length of time over which it will continue to emit radiation. The purpose of this classification system is to ensure that the waste is handled, stored and disposed of in a way that is relevant to the waste's characteristics.

The National Health and Medical Research Council (NHMRC) has developed a *Code of practice for the near-surface disposal of radioactive waste in Australia* based on international recommendations on radioactive waste management. Within this Code, four categories have been developed for the classification of radioactive waste that specifically describes and caters for Australia's radioactive waste. These categories are A, B, C and S.

Categories A, B and C would be regarded as low level and short-lived intermediate level radioactive waste under the International Atomic Energy Agency (IAEA) Safety Guide on the Classification of Radioactive Waste. The NHMRC Code defines categories A, B and C wastes as suitable for near-surface disposal. Category S wastes are regarded as long-lived intermediate level wastes. The amount of long-lived intermediate level radioactive waste generated in Australia is very small, and consists mainly of sealed radium sources and wastes from radiopharmaceuticals. It will include long-lived intermediate level radioactive waste returned to Australia from the treatment of spent fuel from the HIFAR research reactor and a proposed replacement reactor. These wastes are not suitable for disposal in a near-surface repository. The site of a national near-surface repository will be considered for co-location of an above-ground storage facility for long-lived intermediate level wastes.

Table 1 summarises the main characteristics of waste to be disposed of at the proposed repository and consigned to a possible co-located purpose-built store.

The International Atomic Energy Agency classification considers that a heat generation rate of about 2,000 watts per cubic metre is a reasonable lower range to distinguish high level waste from other radioactive waste classes. High level waste requires that heat as well as the level of radioactivity be managed, and is generated from the reprocessing of spent fuel from nuclear power reactors. The proposed near-surface repository and long-lived intermediate level radioactive waste store will not be suitable for high level radioactive waste and will accept only low level and intermediate level radioactive wastes generated by Australia. **Australia does not produce high level radioactive waste** and successive Australian Governments have maintained a policy of not accepting the radioactive wastes of other countries.

Table 1: *Characteristics of waste and management strategy*

NHMRC Category	Radiation type	Waste form	Management strategy
A	Short-lived beta or gamma emitters and very low concentrations of long-lived alpha emitters	Plastics, protective clothing, lab equipment, soil and industrial tools in steel drums.	Near-surface repository
B	Higher levels of short-lived beta or gamma emitter than category A and alpha emitters at relatively low concentrations.	Items with higher levels of contamination, activated items, gauges and sealed radiation sources used in industry, medical diagnosis and therapy.	Near-surface repository
C	Similar radioactivity levels to category B	Bulk waste arising from processing of radioactive materials, significantly contaminated soils or large items of contaminated equipment.	Near-surface repository
S	Long-lived intermediate level radioactive waste. Mainly alpha emitting radioisotopes at significant concentrations and/or beta and gamma sources which exceed limits for near- surface disposal.	Sealed radium sources, industrial radiation sources, radiopharmaceutical production wastes, radium based luminous paints, night marker devices, and solid waste from reprocessing spent research reactor fuel rods immobilised in either a ceramic cement or glass matrix.	Above-ground storage in purpose-built facility.

Wastes to be accepted at the site

A number of submissions raised issues concerning the sources of waste that would be accepted at the repository and the intermediate level radioactive waste store. Some submissions supported the need for a national repository for radioactive wastes currently held in temporary storage at hospitals and research institutions.

The proposed national radioactive waste repository and a possible co-located store for long-lived intermediate level waste will be for radioactive waste generated from the medical, industrial and research use of radioisotopes in Australia. These wastes are currently held in temporary storage by hospitals, industry, research institutions and Commonwealth and State/Territory Government agencies. Much of this waste is a legacy from past medical, research and industrial use of radionuclides. The Commonwealth/State Consultative Committee (C/SCC) on the Management of Radioactive Waste has agreed that a national facility is the best way of safely managing Australia's small quantities of low level and short-lived intermediate level radioactive waste and long-lived intermediate level waste. Further information on the C/SCC on the Management of Radioactive Waste is provided at **Information Box No. 1**.

Australian Nuclear Science and Technology Organisation (ANSTO) would use the national radioactive waste repository to dispose of its accumulated low level and short-lived intermediate level radioactive waste (1080m³) which comprises one third (by volume) of the current national inventory of this category of waste.

Australia holds approximately 500 cubic metres of long-lived intermediate level radioactive waste. Less than half of this volume (205m³) is generated from the operation of HIFAR and associated radioisotopes and radiopharmaceutical production. The national inventory includes thorium residues (165m³) held at ANSTO from the processing of mineral sands by Australian industry 20 years ago and about 100 cubic metres of waste is held by the States and Territories. ANSTO would use the store for long-lived intermediate level radioactive waste currently held on site as well as to store the long-lived intermediate level radioactive waste to be returned to Australia from the reprocessing of our spent fuel rods overseas.

Wastes from the operation and decommissioning of HIFAR, would also be accepted at a national repository and store. The preferred option for the decommissioning of the HIFAR reactor will mostly result in clean or non-radioactive waste (2000m³), with a relatively small quantity of low level and short-lived intermediate level waste (500m³) and very small amount of long-lived intermediate level waste (5m³).

Approximately two-thirds of the current inventory of low level and short-lived intermediate level radioactive waste is lightly contaminated soil which resulted from research by CSIRO into the treatment of radioactive ores over 30 years ago.

The States and Territories also generate small quantities of radioactive waste from medical, research and industrial use of radioisotopes. **Tables 2** and **3** below provide a summary of wastes to be accepted at the repository and the long-lived intermediate level radioactive waste store.

Table 2: 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	Dependant 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

Table 3: 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 generation rate (cubic metres per year)
ANSTO - Radioisotope Production	Solid waste Solid waste from production	205 0.7	1.5 0.03
ANSTO - HIFAR spent fuel reprocessing waste until reactor closure	Wastes in glass matrix from COGEMA Cemented wastes from Dounreay	3 20	nil nil
ANSTO - HIFAR decommissioning wastes	Based on 30 years care and maintenance then entombment	5m ³	nil
ANSTO - Replacement Research Reactor (depends on reactor design and operational factors)	Operational wastes Spent fuel reprocessing waste	No existing volume No existing volume	2 Similar generation rate as HIFAR radiopharmaceutical production possibly increased by a factor of 4
	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

The national long-lived intermediate level radioactive waste storage facility will not be used for storage of spent fuel rods. The degradability of the aluminium cladding and the relatively high enriched uranium content of the HIFAR spent fuel rods require that they be reprocessed. As a consequence, storage of the spent fuel elements is required before they are reprocessed and turned into a stable long-lived intermediate level waste form that is suitable for possible storage at a national above-ground store.

The Australian Government decided in September 1997 that a reprocessing facility would not be established at Lucas Heights or anywhere else in Australia and that the best management option for the spent fuel rods from the HIFAR reactor was reprocessing. Australia has an agreement with the US Government to repatriate 689 spent fuel elements of US origin. No waste will be returned to Australia under this agreement. The remaining 1300 spent fuel rods were to be shipped to Dounreay in the UK for reprocessing (excluding the 114 elements already shipped to Dounreay for reprocessing in 1996). However, on 5 June 1998, the UK Government announced it would cease commercial reprocessing of spent fuel at Dounreay, and would not enter into any further commercial contracts for reprocessing.

ANSTO has since contracted the French reprocessing company, COGEMA, to reprocess HIFAR spent fuel. This reprocessing will produce a volume of about 6 cubic metres of long-lived intermediate level radioactive waste arising from 30 years of HIFAR spent fuel to be returned to Australia. It is expected that no more than 20 cubic metres of cemented long-lived intermediate level radioactive waste would be returned to Australia from the reprocessing of the 114 spent fuel rods sent to Dounreay in 1996.

Spent fuel from a replacement research reactor would also be reprocessed overseas. It can be expected that a condition of any contract for reprocessing spent fuel from a replacement reactor will be that the reprocessing wastes are returned to Australia in due course as long-lived intermediate level radioactive wastes. The exact volume and radioactive content of waste arising from reprocessing of spent fuel from a replacement research reactor will depend on factors such as the nature of the fuel and reactor operating conditions. However, long-lived intermediate level radioactive waste from reprocessing of spent fuel from both HIFAR and a replacement research reactor should amount to no more than several tens of cubic metres. This would only represent a small proportion of Australia's current inventory of long-lived intermediate level radioactive waste.

Management of wastes from the processing of radioactive ores

One submission noted that some slightly contaminated radioactive wastes from the processing of ores would be appropriately disposed of at operating mines or other designated areas where the materials are of like type and ambient levels of radioactivity are generally greater than that of the waste.

The repository will accept historical waste from research into the extraction of radioactive ores. It is expected that the repository will be used for the disposal of approximately 2000 cubic metres of soil lightly contaminated with residues, resulting from research during the 1950's and 60's at a former Commonwealth Science and Industrial Research Organisation (CSIRO) laboratory site in Victoria.

CSIRO is continuing to explore options for disposal of the 2000 cubic metres of lightly contaminated soil as the majority of this waste is of such low radioactivity that its disposal in a repository is unnecessary. The disposal of this waste at an operating mine might be possible but it could cause regulatory difficulties for mine operators.

Wastes from the nuclear power industry

A number of submissions were concerned that the national radioactive waste repository and store were predominantly being created to facilitate the promotion of nuclear power.

The national repository and above-ground store are not for radioactive wastes from the nuclear power industry.

Successive Australian Governments have had a policy of not accepting the wastes of other countries. There is no intention to change this policy.

A national radioactive waste facility will not facilitate the promotion of nuclear power, but is intended for wastes generated from the medical, industrial and research use of radioisotopes in Australia.

The Australian Government is not considering a nuclear power industry for Australia.

Nuclear power reactors generate greater quantities of radioactive waste with higher levels of radioactivity than research reactors, such as Australia's research reactor at Lucas Heights or a replacement research reactor. Australia's research reactor does not generate high level radioactive waste and no high level radioactive waste repository is planned for Australia.

Wastes from the rehabilitation of Maralinga

Some submissions questioned whether waste from Maralinga would be disposed of or stored at the site.

Radioactive waste resulting from the clean up of the former British nuclear test site at Maralinga is being disposed of on-site at Maralinga. The Maralinga Rehabilitation Project is due for completion in 2000.

Waste from other countries

A number of submissions questioned whether other countries' radioactive waste would be disposed of or stored at the site.

Commonwealth Government policy prohibits the importation of other countries' radioactive waste into Australia. This has been the policy of successive Australian Governments. There is no intent to change this policy.

Existing Government policy and the existing restriction under regulation 4R of the *Customs (Prohibited Imports) Regulations* cover Australia from the importation of nuclear waste of foreign origin. Under regulation 4R of the *Customs (Prohibited Imports) Regulations* it is illegal to import radioactive substances (including waste) unless a permit has been issued by the responsible Minister, the Minister for Health and Aged Care, and/or a licence has been issued by an authorised person in ARPANSA. Regulation 4R(1) defines radioactive substance broadly to include any radioactive material or substance, including radium, and radioactive isotope or any article containing any radioactive material or substance. A permit is required to allow long-lived intermediate level waste generated from HIFAR back into Australia.

Most countries have programs in place for the management of their own radioactive wastes. Further information regarding this concern is provided under the heading "No High Level Radioactive Waste Repository for Australia".

9.6 Transport of Radioactive Waste

A number of submissions raised questions about: how the transport of waste to the repository and store would be managed; why it is necessary to transport the waste over such long distances; what sort of notice those living along transport routes would be given; alternatives to road transport; current transport practices in Australia and overseas; and press reports in late 1994 and early 1995 on transport incidents involving radioactive waste.

Transport to the national radioactive waste repository will be infrequent, perhaps only a few times a year because Australia produces only a small amount of waste.

Transporting radioactive waste to the national repository and possible co-located store will be undertaken mostly by road (some wastes may be transported by rail, or air and road). Radioactive wastes will be transported in strict accordance with the *Code of Practice for the Safe Transport of Radioactive Substances, 1990* (the Transport Code) and relevant State and Territory regulations. Further information on the Code is provided at **Information Box No. 4**

Information Box No. 4 *Code of Practice for the Safe Transport of Radioactive Substances*

The *Code of Practice for the Safe Transport of Radioactive Substances 1990* (the Transport Code) adopts the International Atomic Energy Agency's (IAEA) Regulations for the Safe Transport of Radioactive Material in its entirety. The IAEA Regulations, and hence the Code are currently being updated. The objective of the Code is to protect both the transport workers and the public, as well as property, from the direct and indirect effects of radiation during the transport of radioactive materials. To ensure that the Transport Code requirements are being met, quality and compliance assurance programs involving reviews and inspections are regularly implemented.

The Transport Code considers all of the possible operations and conditions associated with the movement of radioactive materials, including both normal and accident conditions. The Code covers every step of the transportation process - from how packages are prepared to how they are consigned, handled and stored in transit, as well as how they are received at the final destination.

The design, fabrication and maintenance of the waste packaging is subject to strict requirements. To assure public and worker safety, wastes are packaged in accordance with a radioactive waste package classification system based on the recommendations of the IAEA. The Transport Code specifies different packaging categories based on the nature of the material, taking into account its type, quality and form.

The Transport Code includes emergency response provisions in case an accident occurs to ensure both worker and public safety and protection of the environment.

Transport infrastructure and ease of access have been considered in the selection of a suitable region. These factors will be considered further in the selection of a suitable site within the region.

As Australia only produces a small amount of radioactive waste, it seems logical to have a national facility, rather than requiring every State and Territory to establish their own repository. The establishment of a national facility will mean that some State/Territory waste will have to be transported a considerable distance. The most appropriate routes for transporting the waste to the facility will be worked out in consultation with the appropriate State/Territory authorities. Environmental impact or damage is very unlikely during the transportation of radioactive waste, given the solid and treated form of the wastes and the stringent packaging requirements. Hence, the risk involved in transporting radioactive waste is comparatively slight, far less than that associated with the transportation of other hazardous materials such as flammables and corrosive substances. Like other vehicles that carry hazardous materials, the vehicles carrying the radioactive waste will be marked according to the Transport Code.

Several submissions raised issues relating to press reports in late 1994 and early 1995 regarding the movement of CSIRO waste and Defence waste to the Woomera Rangehead for interim storage. As a result of the community concern surrounding these reports, an independent review of the transport arrangements was commissioned by the then Minister for Industry, Science and Technology, Senator Peter Cook, and conducted by Mr Michael Codd. Mr Codd's report, "*Review of arrangements for the recent transportation of radioactive waste*" was released in July 1995. The report concluded that the movements of radioactive waste from Lucas Heights (CSIRO waste) and St Marys (Defence waste), were carried out consistent with the Transport Code, with appropriate attention to detail in the planning and execution. The Report noted however, that there was some room for improvement in inter-governmental coordination and public information. In particular, the review found that the movements were effected without any risk to public safety.

9.7 Radioactive Waste Management Infrastructure

A number of submissions suggested that a repository is needed so that wastes are not indefinitely stored at temporary locations such as in hospitals and universities. One submission asked what effect the establishment of the repository would have on the existing infrastructure for the management of radioactive waste.

The establishment of a national near-surface repository and a national above-ground long-lived intermediate level radioactive waste store will assist the coordinated safe management of Australia's radioactive waste. A national near-surface repository will negate the need for States and Territories (with the exception of WA, which has already established a repository at Mount Walton East for disposal of its low level radioactive wastes) to build their own repositories for the final disposal of their low level and short-lived intermediate level radioactive wastes. A national purpose-built above-ground store for long-lived intermediate level wastes would mean that these types of waste would not need to be held indefinitely at temporary locations across Australia.

Although current temporary storage arrangements are safe, in many cases they are not ideal. A national radioactive waste repository and long-lived intermediate level radioactive waste storage facility would greatly reduce the number of temporary stores that currently exist. Centrally located interim storage facilities are likely to be required for storage of radioactive wastes prior to their transfer to the national repository or

Information Box No. 5 *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*

Australia became a signatory to the international *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* on 13 November 1998. The Convention promotes the safe and environmentally sound management of spent fuel and radioactive waste and covers storage, transboundary movement, treatment and disposal of spent fuel and radioactive waste.

The key objectives of the Joint Convention are:

- to achieve and maintain a high level of safety world-wide in spent fuel and radioactive waste management, through the enhancement of national measures and international cooperation, including where appropriate, safety-related technical co-operation;
- to ensure that during all stages of spent fuel and radioactive waste management, there are effective defences against potential hazards so that individuals, society and the environment are protected from harmful effects of ionising radiation, now and in the future;
- to prevent accidents with radiological consequences and to mitigate their consequences should they occur during any stage of spent fuel or radioactive waste management.

national store. Commonwealth, State and Territory Governments will be responsible for deciding arrangements relating to interim storage and transfer of wastes generated within their jurisdiction to the national repository and a national store.

Commonwealth, State and Territory Governments are each responsible for the safe management of radioactive waste generated within their jurisdiction. The Commonwealth Government is responsible for coordinating the effective management of Australia's radioactive waste in accordance with international guidelines, particularly those prepared by the International Atomic Energy Agency (IAEA), and the international *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* (the Joint Convention). Australia was actively involved in the development of the Joint Convention and signed the Convention in November 1998. Further information on the Joint Convention is provided at **Information Box No. 5**

A key element of the Commonwealth Government's framework for implementing aspects of the Joint Convention is the establishment of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). ARPANSA will be responsible for developing and updating national standards to cover the safe management of radioactive waste in Australia, in consultation with State and Territory Governments. Further information on ARPANSA is provided at **Information Box No. 2**.

The Commonwealth Government is committed to working with State and Territory Governments, through the Commonwealth/State Consultative Committee on the Management of Radioactive Waste to ensure Australia-wide radioactive waste management policies and practices are in accordance with the terms of the Joint Convention and other relevant international standards.

9.8 Facility Management

Facility ownership, operation and regulation

A number of submissions raised questions regarding the ownership, operation, security and regulation of the repository and possible co-located long-lived intermediate level radioactive waste store, and how these factors would impact on the monitoring and safety aspects of the facility. Some submissions suggested that the facility should be privately owned and operated while others were of the strong view that it should be Commonwealth owned and controlled. One submission raised the question of how a repository on State controlled land would be regulated. The independence and authority of a regulatory body was also a source of concern, along with representation within the body. There was some criticism of the lack of detailed plans for the operation and management of the facility.

Matters concerning ownership, operation and regulation of the proposed repository will be discussed with stakeholders. A likely option is that the facility will be Commonwealth owned with regulation by the Commonwealth Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). Operation could be by private contractor, with oversight by ARPANSA.

The Australian Radiation Protection and Nuclear Safety legislation ensures arms-length decision making responsibilities for the Chief Executive Officer of ARPANSA. Decisions will be independent from Government and other stakeholders and ensure appropriate separation of regulating and operational functions, as recommended in the Senate Select Committee report “*No time to waste*” and in accordance with the international *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* (**Information Box No. 5**).

The legislation provides for the establishment of an independent advisory body - the Radiation Health and Safety Advisory Council. Members of this Council will be appointed by the Minister for Health and will include representatives from the community, the State and Territory Governments as well as others with appropriate experience. Each member will be appointed on the basis of their standing and their expertise in fields relevant to radiation protection. The Council will oversee the work of a number of standing committees. The standing committees will also comprise experts in the field, together with community and public interest groups.

All of the sites identified for further investigation within the central-north region of South Australia are on lease hold land. Some of these sites have multiple leases and overlapping native title claims applying to them. When a preferred site has been identified on the basis of the suitability of its natural characteristics, discussions to clarify the tenure of the site will be undertaken. It is expected that the Commonwealth Government will have ownership of the site to ensure security of land tenure.

The establishment and operation of a national repository and a possible co-located central store for long-lived intermediate level radioactive waste would satisfy all relevant radiological and environmental regulations, and a monitoring program will be established to ensure continued compliance with the regulations. The repository will be managed in accordance with principles outlined in the National Health and Medical Research Council (NHMRC) *Code of Practice for the Near-Surface Disposal of Radioactive Waste in Australia* (1992). The Code was developed to provide a national standard, based on internationally accepted standards, for the management of near-surface radioactive waste disposal in Australia. The siting, operation and management of a national repository and a central intermediate level waste store will also be in accordance with principles outlined in the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*.

The near-surface repository will be used for disposal of Australia’s current inventory of low level and short-lived intermediate level radioactive waste and estimated annual arisings for about 50 years from the date of its commissioning. The 50 year operational period is an arbitrary period at the end of which it is proposed that the use of the repository be reviewed. Operations will cease at the repository when the authorised disposal space is filled or the limit on total site radioactivity is reached, whichever comes first. Following closure of the near-surface repository the radioactivity of materials disposed of in the facility will decay to safe levels during a period of restricted access and monitoring which would be between 100-300 years depending on repository

design, waste acceptance criteria and operational factors as provided in the *Code of practice for the near-surface disposal of radioactive waste in Australia (1992)*. At the end of this period no further control of the near-surface repository site will be necessary. If a store for long-lived intermediate level waste is still operating after this time, then monitoring and security arrangements would need to be in place for this facility.

Both a national near-surface repository and long-lived intermediate level radioactive waste store would each require a facility licence issued by the regulatory authority. Licensing is expected to be under ARPANSA. The licence would require the operator to prepare contingency plans to address matters such as safety management, radiation protection, radioactive waste management, security and contingency plans for each facility. Plans for the operational and post closure management of both facilities would form part of the proposal detail to be submitted to the Minister for Environment and Heritage for consideration under the *Environment Protection (Impact of Proposals) Act 1974*.

Repository design

Some questions were raised regarding the repository design; the size of the trench and buffer zone; how waste will be disposed of in the trench, the characteristics of the cover; and what additional barriers may be needed. Submissions also asked about the behaviour of the wastes and their packaging over time and possible changes to safety and disposal standards. One submission raised concern about the possibility of soil erosion and its impact on containment of the wastes.

Design criteria for the repository will be based on the requirements of the National Health and Medical Research Council (NHMRC) *Code of practice for the near-surface disposal of radioactive waste*, the International Atomic Energy Agency (IAEA) Radioactive Waste Safety Standards (RADWASS) recommendations and principles outlined in the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. The design will depend on the volumes and types of radioactive waste for disposal, the climate and geology of the site, the dose constraints, regulatory controls and the level of access control that can be imposed while the site is operational. The repository design concept will also be developed in consultation with stakeholders and will include the option of a co-located store for long-lived intermediate level radioactive waste.

The site will occupy an area of 1.5 kilometre x 1.5 kilometre. This area will easily fit the near-surface disposal trenches and a possible long-lived intermediate level radioactive waste store. The facility will consist of one or more trenches less than 20 metres deep for the disposal of Australia's waste. The actual disposal area is expected to cover approximately 100 metres by 100 metres. The buffer zone surrounding this area will be large enough to conduct environmental monitoring and to ensure an adequate distance between the facility and the public. The repository might only need a capacity of 10,000 cubic metres over a 50 year operation based on the quantities of waste identified in **Table 2**.

The repository will be designed to control radionuclide migration from the disposal site. It will include the provision of a multi-layer cover system made from natural materials to control wind and water erosion, to inhibit water ingress and biological intrusion, and also reduce the probability of inadvertent human intrusion in the future. The use of artificially engineered barriers to augment the naturally occurring materials available at the site, is an option which will be considered depending on the location and design ultimately chosen for the repository. The design will consider on-site waste handling facilities; the specified minimum thickness of cover material for the various classes of waste; the segregation requirements for the various classes of waste; the stability requirements for wastes and the facility structure; the need for surface water control; the control of surface and ground water ingress into the waste; the minimum depth of any ground water below the disposal structure; environmental monitoring requirements; and security and buffer zone provisions. A small evaporation pond system will be used to treat water at the site during disposal operations. The solid wastes remaining in the pond after evaporation will be managed as potentially radioactive waste and will be disposed of at the facility.

The waste acceptance criteria including treatment, packaging and conditioning requirements, and activity concentration limits also need to be taken into account in the repository design. All wastes, including those currently packaged in steel drums will be packaged in accordance with stringent operator and regulatory requirements prior to disposal in the repository or consignment to a central intermediate level radioactive waste store.

The repository design, together with waste packaging, and its operation in accordance with strict regulatory requirements will act to ensure the integrity of the site is maintained for the operational life of the site and until restricted access is no longer required.

Once a preferred repository site has been identified, the design concept for the repository and possible co-located store will be further developed taking into account site characteristics, including erosion, in consultation with stakeholders, including relevant regulatory bodies. The design would form part of the detailed proposal to be submitted for consideration under the *Environment Protection (Impact of Proposals) Act 1974*.

Costs of waste disposal

Questions were raised regarding the costs of the facility and user disposal charges. Another submission urged that the uranium mining industry pay the major share of establishing the repository.

Details of the costs of the facility and the user disposal charges will be determined once the design and operational plans for the facility have been finalised. Should the facility be Commonwealth owned, these costs will need to be developed to take into account the licensing and regulatory requirements of the Australian Radiation Protection and Nuclear Safety Authority (ARPANSA).

Uranium mining and milling operators already take responsibility for the radioactive wastes they generate. Wastes generated by the uranium mining (and mineral sands mining industry) are managed and disposed of at or near the site of origin by the mine operator in accordance with requirements of the national *Code of Practice on the Management of Radioactive Waste from the Mining and Milling of Radioactive Ores*, the update of which is currently being coordinated by the Australian Radiation Protection and Nuclear Safety Agency, in consultation with State and Territory Governments.

Monitoring arrangements

Questions were raised about the effectiveness of site monitoring and what the monitoring will consist of.

Detailed records of the waste consigned to, and received at, the repository will be kept as required under the *Code of practice for the near-surface disposal of radioactive waste in Australia (1992)*. Records will include the location of any disposal structures; the location of the waste packages or containers within the structures and date of their emplacement; details of the contents of the waste packages or containers (weight, volume, nature) and concentration of radionuclides in the waste; and details of the backfilling and cover materials. The extent of radioactive decay can be determined on the basis of these records and established decay data, hence there is no requirement to monitor the decay process. This latter point and the detailed nature of the records to be maintained for the repository mean that access to the waste containers for monitoring purposes is unnecessary.

A comprehensive program for environmental and radiation safety monitoring will be prepared as part of the licensing process for the facility. The monitoring results will be reviewed by both the operator and regulator on a regular basis to determine whether environmental and safety objectives are being met.

Environmental monitoring will be carried out prior to construction of the near-surface disposal facility and the possible co-located store to establish baseline conditions. Thorough monitoring will continue throughout the period of the facility's operational and post closure management. This will include monitoring of ground water, external gamma radiation, and concentrations of radionuclides in the air, soil and vegetation. Ground water will be monitored by measuring the concentration of radionuclides in bore water at various locations both in and outside the perimeter of the site.

Future use of the site

A number of submissions asked about the long term impacts of the repository on the region; how these effects would alter with the possible co-location of a long-lived intermediate level radioactive waste store and how the site could be affected by changes in Government policy regarding radioactive waste.

Prior to construction of the repository, plans for closure of the facility and rehabilitation of the site will be prepared and submitted to the appropriate authority for approval. These plans will be reviewed regularly and resubmitted for approval. Prior to closure, detailed closure plans will be submitted. During the repository operation and control period, public access will be controlled and arrangements for site rehabilitation work and maintenance will be in place.

Radioactive waste presented for disposal will need to meet activity concentration limits derived on the basis of recommendations in the *Code of Practice on the Near-surface Disposal of Radioactive Waste*. Activity concentration limits vary according to the period of restricted access and monitoring following closure chosen by the regulating authority (100-300 years). These limits will ensure only waste with low concentrations of long-lived radionuclides will be accepted for disposal. Based on evaluation of exposures that might result from release of radionuclides into the environment and on the anticipated mixture of radioisotopes, a limit on total radionuclide activity for the proposed disposal facility will be established. By the end of the period of restricted access, the radioactive materials will have decayed to safe levels so that control of the repository site will be unnecessary. In the unlikely event of human intrusion on the buried waste after this period, it would not result in significant human exposure or environmental impact above the prescribed radiological dose limits.

The *Code of practice on near-surface disposal of radioactive waste* has detailed guidelines for closure of the disposal facility. Disposal operations at the facility will cease when the authorised disposal space is filled or the limit on total site radioactivity is reached.

A possible co-located store for long-lived intermediate level radioactive waste would be regulated separately from the repository by the licensing authority and would require ongoing site security, monitoring and maintenance. A store would be designed to prevent radionuclide movement into ground water and soil but also provide for ventilation to prevent the build-up of radon gas within the facility. The radon from the facility vented to the outside would be rapidly dispersed and the increase in the natural level of radon in the atmosphere would be insignificant where there is public access. The problem of radon is occupational doses within buildings if the radon collects.

Long-lived intermediate level radioactive wastes would remain in storage at the site until a deep geological disposal facility or alternative arrangements are available or necessary. The costs of establishing a deep disposal facility for long-lived intermediate

level radioactive waste are not justified now or in the foreseeable future given the small quantity of such waste in storage and estimated future arisings. Any future arrangements for final disposal of long-lived intermediate level radioactive waste would be the subject of a separate study. For example, separate site selection criteria would need to be developed for the siting of any planned future geological disposal facility.

High level waste is not produced by the Lucas Heights research reactor. The radioactive waste from the reprocessing of the research reactor's spent fuel overseas will be long-lived intermediate level waste. Successive Commonwealth Governments have adopted a policy of not accepting the radioactive wastes of other countries. Further information on Government policy on the importation of nuclear waste is provided above under the heading "No High Level Radioactive Waste Repository for Australia".

9.9 Alternative Radioactive Waste Management Methods

Some submissions suggested that alternative waste management methods should be investigated and/or that the Government should wait until viable waste management methods are available.

Future research may produce viable alternative disposal/recycling methods for radioactive waste. A national near-surface repository does not preclude the application of these technologies to future waste arisings, but continuing to store radioactive waste at temporary storage sites around the country with an expectation that future technologies will provide alternative solutions is not acceptable, as it leaves responsibility for the management of our radioactive waste to future generations and to the current and future managers of temporary storage sites. In fact unprocessed spent fuel rods from HIFAR and spent fuel rods from a replacement reactor are likely to benefit from advances in technology for the treatment of waste. Vitrification, ceramics and Synroc technologies produce a stabilised waste form of significantly reduced volume.

The Government considers that a national near-surface repository and national store for long-lived intermediate level radioactive waste is an appropriate solution to the safe and efficient management of Australia's radioactive wastes. This strategy has been endorsed by the Commonwealth/State Consultative Committee on the Management of Radioactive Waste. The approach is also consistent with practices agreed within the international scientific community and at the international inter-governmental level.

Information regarding radioactive waste management alternatives is provided in the Draft Environmental Impact Statement for the Proposed Replacement Research Reactor 1998 and its Supplement, 1999.

Storage at the site of origin

Several submissions suggested that the generators of waste should continue to store or dispose of waste on their site rather than in a national facility. Similarly, one submission suggested that spent fuel rods should continue to be stored at Lucas Heights until further developments in immobilisation technology have been developed. A number of submissions saw temporary on-site storage, particularly at hospitals and universities, as the main reason why a national facility was necessary.

Storage of radioactive waste at the site of origin may be supported by some because they consider waste management to be the responsibility of those who produced the waste. It may be considered that such a policy may encourage waste minimisation. This view takes no account of the fact that in Australia much of the waste currently held in storage is a legacy from past medical, research and industrial use of radionuclides. Some types of waste are either no longer generated or the quantities produced have been reduced as a result of technological advances, for example old radium style smoke detectors and luminous tritium exit signs. In many cases the original generator may no longer exist or is unknown and in some cases the radioactive wastes have been collected at a central point by a private organisation or Government agency to ensure their safe management and ultimate disposal.

Radioactive waste is presently held at over fifty interim storage sites throughout Australia. The waste is accumulating slowly, at a rate of about 50 cubic metres per year, but in many cases it is held in temporary storage by hospitals, industry and research institutions and Government agencies in buildings that were neither designed nor located for the long term storage of radioactive material. Some temporary stores are filled to capacity and some sites are required for redevelopment. Disposal at a purpose-built national repository is preferable to these existing arrangements. For the same reason, an above-ground store is required for long-lived intermediate level waste, such as sealed sources, currently held at temporary storage sites around Australia.

In addition because most Australians benefit either directly or indirectly from the use of radionuclides, particularly from their medical and manufacturing applications, it is in the interests of the public that Governments establish the necessary infrastructure to ensure the safe management of Australia's resulting wastes.

State Repositories

Some submissions suggested that each State and Territory should be responsible for their own wastes.

Australia's Commonwealth, State and Territory Governments are responsible for the management of radioactive wastes produced within their jurisdictions. Coordination is desirable as it would be inefficient to establish separate disposal facilities in each jurisdiction because of the relatively small quantities of stored waste and low rate of annual increase. Western Australia has its own facility at Mt Walton East for low level waste generated in WA. All other States and Territories intend to use a national facility.

In 1986, the Commonwealth/State Consultative Committee on Radioactive Waste Management reported that it would be wasteful of resources to establish repositories in each State and Territory, and that the small total amount of waste justifies only one or two facilities.

Alternative disposal sites

The Mt Walton East integrated waste disposal facility in Western Australia and Maralinga were suggested as potentially suitable national repository sites.

The Mt Walton East facility is located in the Jackson region which was identified as one of the eight regions throughout Australia suitable for further investigation in Phase 2 of the site selection study. The Jackson region was not selected as the most suitable region because it did not offer as many suitable areas within the region, according to the application of site selection criteria in Phase 3 of the study. Principally, in addition to having larger areas that meet the site selection criteria, the central-north region of South Australia has the advantage over the Jackson region in that it is closer to where the waste is currently stored and the main sources of waste production in eastern Australia.

Maralinga, like the Jackson region, did not contain as many large areas of suitable sites as the central-north region of South Australia.

Disused or used mine sites

Some submissions suggested permanent disposal of radioactive waste in a disused mine. During public consultation, the suggestion was made that radioactive waste could be disposed of in a working mine, such as the Olympic Dam mine.

The issue of siting a national radioactive waste repository in a disused mine has been considered by the Commonwealth Government. Although this option may appear simple, the technical difficulties in licensing, regulating and monitoring such a site do not make such an option feasible. Any mine site would need to be assessed against the technical selection criteria, and the method of disposal would need to meet the regulator's requirements.

Disposal of radioactive waste in an operating mine such as the Olympic Dam mine would pose operational difficulties in that the waste would need to be regularly monitored, which could interfere with normal mine operations.

Deep geological disposal

One submission asked why deep geological disposal of low and short-lived intermediate level radioactive waste was not being considered as an option.

The waste to be disposed of in the national near-surface repository is solid, low level and short-lived intermediate level radioactive waste. Deep geological disposal would be a technically excessive and unnecessarily expensive approach for disposal of the solid low level and short-lived intermediate level radioactive waste produced in Australia. Deep geological repositories are, however, required for disposal of long-lived intermediate level and high level radioactive wastes.

Given Australia's small quantity of long-lived intermediate level waste the costs of a deep geological disposal facility cannot be justified for this waste at present. The Government proposes that this waste be stored at a national above-ground storage facility, possibly co-located with the repository, until geological disposal is justified or alternative arrangements are available.

Above-ground storage

Some submissions queried the Commonwealth's decision to proceed with disposal of low level and short-lived intermediate level waste despite the Senate Committee's recommendation that all radioactive waste be stored. Other submissions supported the disposal of low level waste rather than its storage, for economic and safety reasons.

As detailed in the Government's response to recommendation 17 of the Senate Select Committee report *No Time to Waste*, disposal of suitably packaged low level and short-lived intermediate level radioactive waste in a near-surface repository is preferable to above-ground storage. The natural substrate provides an additional barrier to radioactivity and greatly reduces any risk of inadvertent human intrusion, vandalism and removal of radioactive material.

Near-surface disposal in a suitably designed and managed structure, in accordance with established safety principles and disposal standards, is recognised internationally as an appropriate method for managing low and short-lived intermediate level radioactive waste. It is also consistent with the internationally agreed objective of dealing with radioactive waste in a manner that protects human health and the environment without imposing undue burdens on future generations.

Above-ground storage is, however, being considered for long-lived intermediate level radioactive waste pending arrangements for their final disposal. Further information on the management of this type of waste is provided above under the heading "Co-location of an Above-ground Long-lived Intermediate Level (Category S) Radioactive Waste Store".

Synroc

Some submissions suggested the use of Synroc as an alternative waste management method.

Synroc is a ceramic waste form for the immobilisation of high level, intermediate level and actinide-bearing radioactive wastes. The original impetus of the ANSTO Synroc program was for the immobilisation of high level radioactive waste from the reprocessing of nuclear power reactor spent fuel. The Commonwealth, through its research bodies, will continue to investigate the application of this technology with key organisations involved in high level radioactive waste management in all countries pursuing commercial reprocessing of spent power reactor fuel.

Synroc technology is being considered as a future management option for immobilising waste from the overseas reprocessing of spent fuel from a replacement reactor. Use of Synroc would make the waste suitable for storage in the national long-lived intermediate level waste store and eventual disposal in a geological repository. The reprocessed waste from the application of this technology would be returned to Australia as long-lived intermediate level waste.

9.10 Alternatives to Waste Creation

A number of submissions suggested that alternatives to waste creation need to be encouraged. Another considered that we could do without medical radioisotopes.

The Government agrees that alternatives to the creation of radioactive waste should be encouraged, and there should be strong economic incentives to minimise radioactive waste production. The Commonwealth and State agencies are continually addressing methods to encourage waste minimisation, as part of their waste management strategies. It is intended that a national repository will operate on the basis of user pays. A fee can be calculated that reflects the true cost of disposal operations and encourage waste minimisation.

Recycling of radioactive wastes such as radioactive sources in gauges is encouraged by State and Commonwealth Governments, but much residual radioactive material cannot be recycled as it comprises materials lightly contaminated with radioactivity.

Many users of radiation sources have agreements providing for return of spent sources to the supplier, which may reuse components of that source.

There are currently no feasible alternatives to many uses of radionuclides in medicine, industry and research and until effective alternatives are found, small amounts of radioactive waste will continue to be produced in Australia from the medical, research and industrial use of radioisotopes.

Cyclotron technology

Cyclotron technology was suggested as an alternative means of production of radioisotopes.

Cyclotrons are used in Australia for the production of medical isotopes. The issue of whether a cyclotron could be used in place of a research reactor has been extensively covered in the discussions about installation of a replacement research reactor at Lucas Heights.

The Draft Environmental Impact Statement for a Replacement Reactor (EIS) states that most medical radioisotopes can be produced only in either a nuclear reactor or by a cyclotron. Few can be produced in both. Both reactors and cyclotrons are needed to make a full range of radioisotopes required for medicine, because of the different types of isotopes they are capable of producing.

According to the Draft EIS, currently around 80 percent of all nuclear medicine procedures in Australia use the radioisotope technetium-99m, which is the daughter radioisotope resulting from the decay of molybdenum-99. ANSTO provides more than 95 percent of the technetium-99m used in Australia and the parent nuclide is produced in the reactor HIFAR. Technetium-99m generators produced at ANSTO are also exported to nuclear medicine centres in South East Asia.

At the scientific level, there is an ongoing debate about the ability of cyclotrons to produce technetium-99m of the required specific activity and purity in sufficient quantities suitable for commercial production and distribution, particularly in a large country such as Australia. Technetium-99m, contained with other radioisotopes, has flow on effects on image resolution and patient dose.

Cyclotrons and research reactors both produce radioactive waste which must be managed. Australia needs a national strategy for managing and disposing of its existing and future radioactive waste regardless of whether a replacement reactor is established. The generation of radioactive waste is a by-product of activities accepted in the community as being beneficial in terms of their contribution to human health and safety, environmental protection and research in these fields. Further information on cyclotron technology can be found in the Draft Environmental Impact Statement for the Proposed Replacement Research Reactor 1998 and its Supplement, 1999.

Importation of radioisotopes

Importation of radioisotopes from overseas was suggested as an alternative method to creation of radioactive waste.

Importation of radiopharmaceuticals could in principle meet the demand for the most commonly used diagnostic radioisotopes, however a number of short-lived and emerging therapeutic radioisotopes could not be imported. There are also issues regarding reliability of supply, and expiry of 'use by' times due to in-transit delays with importing which would affect the maintenance of current levels of health care.

Even if Australia imports all its radioactive isotopes and radiopharmaceuticals, there will still be a need for a national repository for the existing wastes and arisings from imported radioactive materials.

It should be noted that a total reliance on imported radioisotopes for medical, research and industrial uses in Australia would mean that Australia would benefit from the production of radioisotopes by another country while that country bears the burden of dealing with radioactive wastes resulting from production. In principle, this is the equivalent of exporting Australian radioactive waste overseas. Australia would also lose much of its capability, valued internationally, to contribute to developments in the field of radiation safety and radioactive waste management and nuclear research in medicine, industry, agriculture and environmental studies.

10. Next Steps

The Commonwealth Department of Industry, Science and Resources will carry out an investigative drilling program on up to 18 sites in the central-north region of South Australia to obtain further data on geology and ground water characteristics. The number of investigative sites will continue to be narrowed down from up to 18 to 5, and then to 3 sites, on the basis of field studies and analysis, and consultation with stakeholders. A preferred repository site, along with two alternatives, is expected to be identified late in 1999. Once a preferred site is identified, the detailed proposal will be reviewed in accordance with relevant statutory processes including the *Environment Protection (Impact of Proposals) Act 1974* (Commonwealth).

The Department will continue to consult with stakeholders, including Aboriginal stakeholder groups, both individually and through consultative committees, on the siting of the repository.

Site investigations are being undertaken by the Bureau of Rural Sciences (BRS) and the Australian Geological Survey Organisation (AGSO). Drilling investigations will provide accurate core samples for geotechnical, geochemical and hydrogeological assessment of the sites for near-surface disposal of Australia's low level and short-lived intermediate level radioactive waste.

Consistent with the Government's 1996 response to the report by the Senate Select Committee on the Dangers of Radioactive Waste, the Government will consider co-location of a purpose built above-ground store for long-lived intermediate level radioactive waste with the national repository. The main site requirements for an above-ground store include suitable transport infrastructure, and the maintenance of effective security at the facility. The Government will progress the repository proposal and community consultation on the basis that co-location of a repository and store is a possibility.

The community consultation program for Phase 3 is principally focused on the identified region. Once a preferred site is identified, on the basis of detailed field investigations and community consultation, the emphasis will shift to liaison with the immediate community. A local community consultative committee will be established to represent local interests around the site. It is likely that some members of the Regional Consultative Committee will also be members of the local committee. This will provide continuity and allow for wider regional interests to continue to be represented.

The siting, design, construction, operational and post closure management of a repository and possibly a co-located store, will be submitted for consideration under the *Environment Protection (Impact of Proposals) Act 1974*.

The national radioactive waste repository project study group is available to answer questions relating to the project throughout its duration. Questions should be sent in writing to:

The Information Officer
National Radioactive Waste Repository
Coal and Mineral Industries Division
Department of Industry, Science and Resources
GPO Box 9839
CANBERRA ACT 2601

Telephone: Tollfree 1800 682 704
Facsimile: 02 6272 4178
Email:radwaste.repository@isr.gov.au

This report, the Phase 1–3 discussion papers and general background on radioactive waste is available at <http://www.nric.gov.au/nric/old/projects/assess/radwaste.html>

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- Senate Select Committee on the Dangers of Radioactive Waste (1996), *No Time to Waste*, Senate Printing Unit, Canberra.

Useful Web Sites

- The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
<http://www.health.gov.au/arpansa.htm>
- The International Atomic Energy Agency (IAEA)
<http://www.iaea.org/worldatom/glance/>
- The Nuclear Energy Agency
<http://www.nea.fr/welcome.html>
- The International Commission on Radiological Protection
<http://www.icrp.org/>

18 February 1998 Media release by the Minister for Resources and Energy on release of the Phase 3 discussion paper

Tel 136 277 1489
FAX 136 278 4136



SENATOR WARWICK PARER
MINISTER FOR RESOURCES AND ENERGY

MEDIA RELEASE

DPLE98/276p

18 February 1998

S.A Region Selected for National Radioactive Waste Repository Site.

A 67,000 square kilometre region in South Australia has been identified as the most suitable area in which to site the proposed 2.5 hectare National Radioactive Waste Repository, Federal Minister for Resources and Energy, Senator Warwick Parer, announced today.

The Billa Kalina region in South Australia has a northern boundary extending from 20 kilometres east of Coober Pedy to 10 kilometres west of Marree, excluding Lake Eyre. Its southern boundary extends from 50 kilometres northwest of Tarcoola, to 40 kilometres west of Hawker.

The towns of Andamooka, Roxby Downs and Woomera lie within the region.

The selection ends a search for the most suitable region that started in 1992 when the then Labor Government committed itself to a national repository.

The selection of the final site, the size of a football field, will follow extensive field investigations and a community consultative phase which could take up to a year. The site will be surrounded by a buffer zone bringing the total area to just over two square kilometres.

Senator Parer said the selection demonstrated the Commonwealth Government's commitment to responsible long-term management of Australia's small quantity of radioactive waste.

"I now invite public comment on the discussion paper," he said.

"The Bureau of Resource Sciences, in my Department, have undertaken a rigorous evaluation of the Australian continent against a set of technical and social criteria which are relevant to the near-surface disposal of radioactive waste. Eight regions were identified in the 1994 Phase 2 report, and, of these, the Billa Kalina region has been selected for further study as it contains the largest area of land considered suitable for a repository site against the selection criteria," said Senator Parer.

"The Billa Kalina region will now be the subject of detailed field investigations over about a year to identify a potentially suitable site for a National Radioactive Waste Repository. The selected site would then undergo environmental assessment under the Environment Protection (Impact of Proposals) Act 1974," the Minister said.

The low level and short-lived intermediate level waste which will be disposed of in the National Radioactive Waste Repository is currently stored at over 50 locations around the country. The material comprises items such as lightly contaminated plastics, paper, laboratory equipment and clothing, industrial smoke detectors and radium-painted luminous watch faces, compasses and instrument dials. In Australia, about 3,500 cubic metres of the waste has accumulated over 50 years of medical, research and industrial use of radioactive material.

Senator Pater stressed that community consultation is an important part of the Phase 3 site selection study.

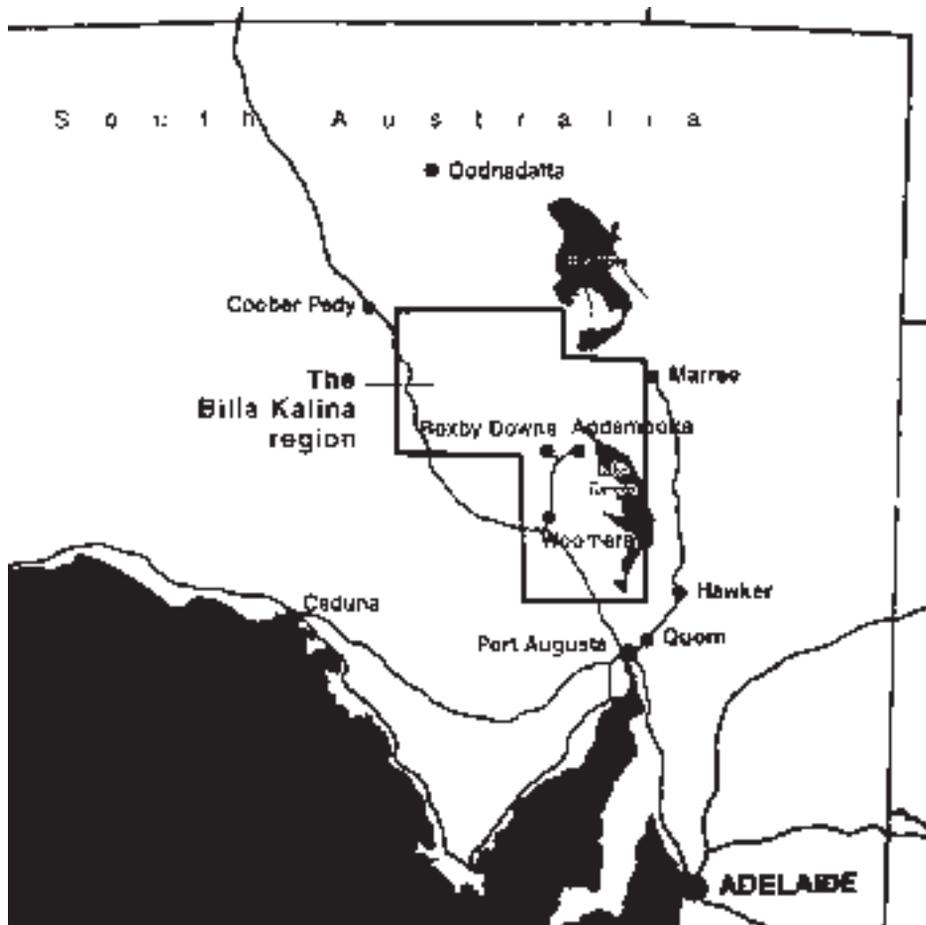
"A program of community consultation will ensure that the regional community and other stakeholders are fully informed about the project. Consultative committees will be established for discussion of the matter," Senator Pater said.

"Commonwealth, States and Territories agree that the co-location of a repository and an above ground storage facility at a single national site would provide a comprehensive strategy for Australia's small inventory of radioactive waste," Senator Pater said.

Copies of the discussion paper, entitled 'A Radioactive Waste Repository for Australia: Site Selection Study - Phase 3 Regional Assessment,' and information kit may be obtained by calling the following toll-free phone number: 1800 682 704.

Written comments on the paper should be submitted by 30 April, 1998, to the Information Officer, National Radioactive Waste Repository Project, Department of Primary Industries and Energy, GPO Box 858, Canberra ACT 2601.

Contact: Bob Raudino, Senator Pater's Office (02) 6277 7442



10 June 1998 Media release by the Minister for Resources and Energy on the identification of 18 sites for study



DPIE 98/327P

10 June 1998

18 SITES SELECTED IN SA FOR INVESTIGATION FOR NATIONAL RADIOACTIVE WASTE REPOSITORY

Australia's National Radioactive Waste Repository will be located on one of 18 possible sites selected for further intensive testing within a 67,000 square kilometre region of South Australia, Federal Minister for Resources and Energy, Senator Warwick Parer, announced today.

"Each site covers a few square kilometres," Senator Parer said. "The repository itself, when completed, will be based on a two square kilometre area.

"The 18 sites have been selected on the basis of technical desk-top studies, and like the original selection of the SA region, were based on factors such as rock type, mineral potential, rainfall (and flooding), water flows above and below the ground, and population density.

"Sites were chosen away from creeks, sand dunes, or areas of potential flooding. The 16 sites now selected for detailed study in the Woomera-Roxby area are located on raised gibber plains, which are underlain by sandstone. The two more northerly sites are located on raised plateaus and ridges of siltstone."

Senator Parer said that there would be continued consultation with relevant stakeholders, including pastoralists and indigenous groups in relation to the siting process.

"The Regional Consultative Committee, which is composed of stakeholders from throughout the region, will now meet to discuss the sites. This Committee will continue to meet throughout the year to discuss the progress of the repository siting study," the Minister said.

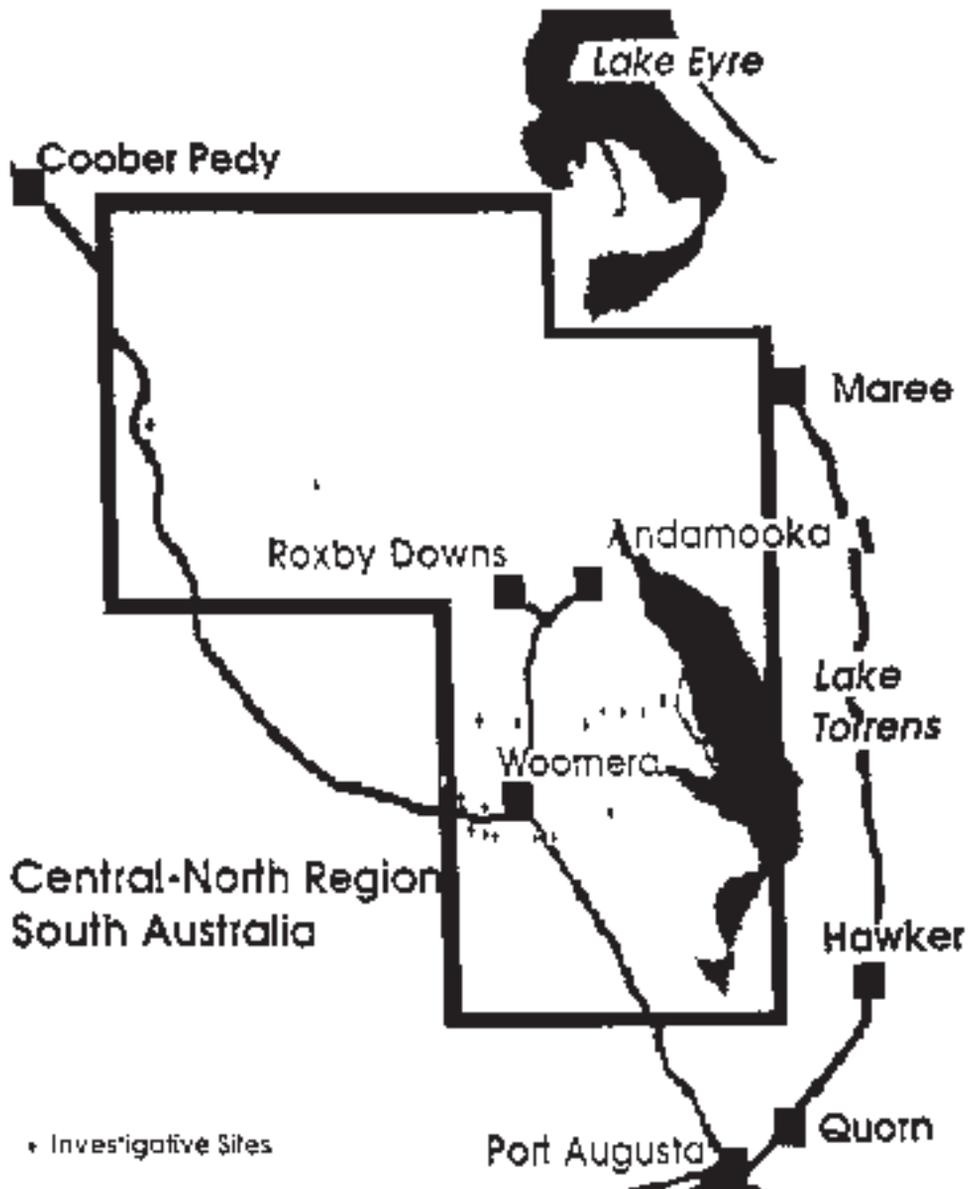
A preferred site, to be identified at the end of 1998 or early 1999, will be about the size of a football field, and will be surrounded by a buffer zone, bringing the total area to just over two square kilometres.

"When the preferred site is identified, it will undergo environmental impact assessment," said the Minister.

Further inquiries:

Senator Parer's office
Bob Hudson 0419 438 813

Investigative Sites in the Central-North Region of South Australia for the National Radioactive Waste Repository



Terms of Reference for the Commonwealth/ State Consultative Committee on the Management of Radioactive Waste

The Committee is to prepare recommendations for implementing the coordinated management in Australia of radioactive waste. Specifically the Committee is to:

- 1) identify consistent standards, criteria and guidelines for the safe and environmentally sound management of radioactive waste by the Commonwealth, States and Territories, that take account of international standards;
 - 2) identify and consider issues relating to the management of:
 - a) radioactive waste suitable for use/d disposal in air, water and landfill;
 - b) radioactive waste from the medical, industrial, agricultural and research uses of radionuclides, and other radioactive waste, suitable for disposal in a near-surface disposal facility;
 - c) establishment and operation of a national repository and other facilities for the disposal and storage of radioactive wastes;
 - d) long-lived intermediate level radioactive wastes requiring long-term isolation within the environment;
 - e) naturally occurring radioactive material (NORM) waste
 - 3) ensure there is adequate coordination between the Commonwealth, States and Territories in developing and implementing national waste management policies and programs;
 - 4) report to Ministers as appropriate on these matters.
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Advertisement seeking public comment on the Phase 3 discussion paper

A RADIOACTIVE WASTE REPOSITORY FOR AUSTRALIA:

SITE SELECTION STUDY - PHASE 3 REGIONAL ASSESSMENT

A Discussion Paper on Phase 3 of a project to identify a suitable site for a national near-surface repository for Australia's low-level and high-level intermediate-level radioactive waste was a subject of the comment.

A Radioactive Waste Repository for Australia Site Selection Study - Phase 3, Regional Assessment has been prepared by the Bureau of Resource Sciences. It describes the methodology used to select a preferred region for final investigation to identify a suitable repository site.

Persons or organisations wishing to comment on the paper are invited to make written submissions by 30 March 1985 to:

The Information Officer
National Radioactive Waste Repository Project
Department of Planning, Evaluation and Energy
PO Box 459
CANBERRA ACT 2601

Telephone: Tollfree 1800 62 701
Facsimile: 70 6272 4374
Email: Repository@pse.gov.au
Internet: <http://www.simg.gov.au/html/projects/assess/ra/faq/ra.htm>

Copies of the paper can be obtained from the Information Officer

List of respondents to the Phase 3 discussion paper

Adamski, L. G. Queensland, WA
 Aitchison, W. Gas Process, Canberra, ACT
 Arnold, P. J. Port Pirie City and District Council, Port Pirie, SA
 Basso, A. Management Committee of Pipers Ponds and Outlook SA Tourism Incorporated, Adelaide, SA
 Backell, B. Darwin, ACT
 Brass, J., Municipal Council of Fooby Downs, Fooby Downs, SA
 Bury, T., Cooper Peds, SA
 Buzzaton, M. and the Anzania People Aboriginal Tent Embassy, Kamburundji, ACT
 Collins, G. Port Augusta, SA
 Crundwell, D. A. Urrah CWA, SA
 Cummings, J. J. Urrah CWA, SA
 Corbett, E. Alice Pt. Kings T. U. Aboriginal Corporation, Cooper Peds, SA
 Cooper, D. M. Environmental Radioactivity Group, Australian Radiation Laboratory, VIC
 Conna, J. D'Connell, ACT
 Corneil, B. Cooper Peds, SA
 Corneil, M. Cooper Peds, SA
 Davies, H. Alan Tingey & Associates, Perth, WA
 Deagle, S. L. Cooper Peds Agency, Federal on Waste Repository Queensland, SA
 Edwards, Roy, W. D. School of Biotechnology and Molecular Cell-Lab, The University of NSW, Sydney, NSW
 Faulkner, P. J. Catholic Education Commission, Catholic Diocese, Geelong, Adelaide, SA
 Fehler, K. B. Physics Department, University of Tasmania, Sandy Bay, TAS
 Fitzgerald, J., Comandac Valley, SA
 Gee, P. Maita-Coddrington Soil Conservation Board, Port Augusta, SA
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 Gee, P. South Australian Catholic Presbyter, Port Augusta, SA
 Grant, G. G. Australian Democrats, The Magazine Ladies' Room, Faulktonville, NSW
 Green, L. P. North Adelaide, SA
 Greenaway, P. School of Biological Science, The University of NSW, Sydney, NSW
 Grossman, B. Cooper Peds, SA
 Hag, J. Queensland, NSW
 Harty, C. Australian Nuclear Association Inc., Redhurst, NSW
 Himes, T. I. Australian Science and Technology Organisation, Lucas Heights, NSW
 Ingham, M. Queensland Government - Minerals Dept., Brisbane, Q. D.
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 Jane, F. Stoney Bay, SA
 Jardon, H. Cooper Peds, SA
 Kellogg, D. Tharwa, ACT
 Laid, A. Marabie, SA
 Leitch, J., Port Augusta, SA
 Lyle, A. C. South Australian Country Women's Association Inc., Karl Town, SA
 Leslie, P. Alice Pt. Kings T. U. Aboriginal Corporation, Cooper Peds, SA
 Lewis, J. Spencer Gulf Environmental Alliance Inc., Port Pirie, SA
 Lock, F. W. Darwin, SA
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 Page, T. C. Northmead, NSW
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 Pether, S. Cooper Peds, SA
 Price, D. Cooper Peds, SA
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 Woods, P. J. Henmark, SA

Rosen, D. P. Safety and Environment Services, The University of NSW, Sydney, NSW
Rowley, M. County Women's Association of Western Australia, West Perth, WA
Sawell, G. A. Association of Mining and Exploration Companies, West Perth, WA
Schulzmann, G. Coaster Pools, SA
Schindhelm, K. Graduate School of Bomadale Engineering, The University of NSW, Sydney, NSW
Sharp, N. Rangway, WA
Shaw, B. Tharwa, ACT
Shawes, J. Coaster Pools, SA
Smart, D. The ss Environmenta Services, QLD
Smith, C. S. Scanlath Manufacturing Company, Jolley, SA
Sonder, H. Coaster Pools, SA
Taylor, D. O'Connor, ACT
Tuoponen, E. W. Barker, SA
Travis, J. B. Royal Prince Alfred Hospital, Department of PET and Nuclear Medicine, Camperdown, NSW
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Turnach, R. Pen Augusta, SA
Vannan, C. Friends of Earth, Fitzroy, VIC
Walker, Prof. J. School of Pathology, The University of NSW, Sydney, NSW
Wall, B. Oceania Health Consulting, Fremantle, WA
Wainman, D. Coaster Pools/Water Association Incorporated, Coaster Pools, SA
Waltman, J. B. Wadham, SA
Williams, J. G. Environmental Epidemiology Group, Australian Radiation Laboratory, VIC
