Supplement to the Draft EIS

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Abbreviations

Chemical Symbols and Formulae

^{241}Am	americium-241
^{135}Cs	caesium-135
^{137}Cs	caesium-137
^{60}Co	cobalt-60
^{99m}Mo	molybdenum-99m
^{90}Sr	strontium-90
^{99m}Tc	technetium-99m
^{238}U	uranium-238

Other Abbreviations

ALARA	as low as reasonably achievable
ANSTO	Australian Nuclear Science and Technology Organisation
ARI	average recurrence interval
ARIUS	Association for Regional and International Underground Storage
ARPANS Act	*Australian Radiation Protection and Nuclear Safety Act 1998*
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ARPANSA 2001 Code	*Code of practice for the safe transport of radioactive material (2001)*
AS	Australian Standard
ASIO	Australian Security Intelligence Organisation
CEO	Chief Executive Officer
CFS	Country Fire Service (South Australia)
Defence	Department of Defence (Commonwealth)
DEST	Commonwealth Department of Education, Science and Training
Draft EIS	*National Radioactive Waste Repository Draft Environmental Impact Statement*
EIS	environmental impact statement
EMA	Emergency Management Australia
EMMP	environmental management and monitoring plan
EMP	environmental management plan
Environment Australia	Commonwealth Department of the Environment and Heritage
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	ecologically sustainable development
HAZMAT	hazardous material(s)
HCA	heritage clearance agreement
HIFAR	High Flux Australian Reactor
IAEA	International Atomic Energy Agency
MFS	Metropolitan Fire Service (South Australia)
n.a.	not available
NHMRC	National Health and Medical Research Council
NHMRC 1992 Code	*Code of practice for the near-surface disposal of radioactive waste in Australia (1992)*
NOHSC	National Occupational Health and Safety Commission
NSG	Not in the scope of the guidelines
NSWFB	New South Wales Fire Brigade
PB	Parsons Brinckerhoff Australia Pty Limited
PMP	probable maximum precipitation
PPK	PPK Environment & Infrastructure
RCC	Regional Consultative Committee
WIR	Woomera Instrumented Range
WMC	WMC Limited (formerly Western Mining Corporation)
WPA	Woomera Prohibited Area

Chapter 1
Introduction

1.1 Draft EIS Release and Supplement Preparation

1.1.1 Draft EIS Release and Public Viewing

The *National Radioactive Waste Repository Draft Environmental Impact Statement* (Draft EIS) was released for public comment on 29 July 2002. The Draft EIS describes the proposed national repository, and assesses the likely environmental, social and economic impacts of the proposal.

The Draft EIS was prepared in accordance with Guidelines issued by Environment Australia under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proponent is the Department of Education, Science and Training (DEST).

The public notice sought comments on the Draft EIS till 21 October, a period of 60 working days. Copies of the Draft EIS were available for viewing at:

- Australian Government Info Shop, 60 Waymouth Street, Adelaide
- SA Government Environment Shop, 77 Grenfell Street, Adelaide
- DEST (Adelaide office), KPMG House, Level 4, 115 Grenfell St, Adelaide
- Woomera Information Centre, Dewrang Ave, Woomera
- Roxby Downs Municipal Council offices, Richardson Place, Roxby Downs
- Port Augusta Council Office, 4 Mackay Street, Port Augusta
- all major state/territory public libraries, including:
  - South Australian State Library, North Terrace, Adelaide
  - Broken Hill Library, Charles Rasp Memorial Blend Street
  - the library of Environment Australia (Canberra).

The full report (main document, appendices and summary) was also available on the DEST website at www.dest.gov.au/radwaste/ or via the Environment Australia website at www.ea.gov.au/epbc/news/index.html.

The release of the Draft EIS was advertised in state and national newspapers.

Copies of the Draft EIS were available for purchase at a cost of $50 (including GST) per hard copy, $10 (including GST) for CD-ROMs and $2.50 (including GST) for the summary, from the Australian Government Bookshops in each state and territory.

Copies of the summary were widely distributed free of charge. Free copies were distributed to people who had previously made submissions on public discussion papers on the project and to people who attended information days. They were also available at some locations in the central–north region of South Australia where the Draft EIS was on display.

Comments on the Draft EIS were invited by letter, facsimile or email. All submissions were treated as public documents unless confidentiality was requested.

1.1.2 Draft EIS Consultation

Community consultation information days were held in Broken Hill, Port Augusta, Woomera, Roxby Downs and Andamooka during the public display period. These information days, held 16–22 August, were advertised beforehand in *The Advertiser*, regional papers and in

DEST's *The Monitor* newsletter, which was distributed to households in the central–north region.

Meetings were also held with the Regional Consultative Committee (RCC) and local pastoralists. Representatives of DEST, Environment Australia and PPK Environment & Infrastructure (now Parsons Brinckerhoff Australia Pty Ltd (PB)) and the scientific adviser to the national repository project, Dr Keith Lokan, were present at these information days and meetings.

The Commonwealth offered to brief South Australian officials who were members of the Commonwealth/State Consultative Committee on Radioactive Waste Management on the Draft EIS, but the South Australian Government declined the offer.

The Australian Conservation Foundation organised a public meeting in Adelaide (in the Norwood Town Hall) on 3 September, which attracted about 300 people. Dr Keith Lokan, one of several speakers, made a presentation about the national repository to the meeting.

Copies of the Draft EIS Summary, as well as information on the national repository, the proponent, the uses of radioactivity and of radioactive materials, and the proposed store for intermediate level waste, were also available during the consultation days and meetings.

The Draft EIS in hard copy and on CD-ROM were available for sale at the community consultation days.

1.1.3 Number of Submissions and Key Issues

A total of 667 submissions were received in response to the Draft EIS, 659 from the general public, and eight from local and state government agencies and bodies. One public submission was withdrawn. Submissions were accepted to 23 October.

The areas of primary interest and/or concern, reflected by the number of submissions and comments, were:

- South Australian Government and public opposition to the siting of the national repository in South Australia
- that the national repository would lead to the co-location of the national store for long-lived intermediate level waste, and the disposal or storage of international waste
- the community consultation process, including consultation with Aboriginal groups
- waste arising from the existing and proposed reactors at Lucas Heights
- transport through communities and primary produce areas
- potential effects of siting the national repository in South Australia on the state's clean green image
- the ongoing generation of radioactive waste, and use of radioactive materials
- long-term integrity of the national repository and potential environmental impacts
- the proposed location of the national repository within the Woomera Prohibited Area (WPA).

1.1.4 The Process used to Summarise the Submissions

Upon receipt, DEST numbered and recorded all submissions on the Draft EIS. A copy of each submission was retained by DEST and copies were forwarded to Environment Australia and to PB.

The submissions were summarised and edited by PB. Copies of the summaries were forwarded to DEST and Environment Australia.

The comments were further summarised and amalgamated into key issues which, along with the responses to them, make up the bulk of this supplement.

1.2 Structure and Scope of the Supplement

1.2.1 Structure of the Supplement

Comments were received on most chapters of the Draft EIS. As much as possible the order of subject matter presented in this supplement follows the order of the Draft EIS. All of the chapter headings, and most of the section headings, follow those of the Draft EIS.

Throughout the text, the summarised and amalgamated key issues and comments are shown in bold italics. Each is immediately followed by the proponent's response in plain text.

This supplement includes three appendices:

- Appendix A — List of Respondents
- Appendix B — Summaries of Responses and Index
- Appendix C — Errata.

Appendix A lists the number, name of the author, state of origin and submission type (e.g. Proforma submission — A, Individual submission) of each submission.

Appendix B contains summaries of the submissions listed in the order of proforma submissions (Types A, B, C, etc), followed by submissions from government agencies (G0001, G0002, etc) and lastly individual submissions (P0001, P0002, etc). Each is referenced by their number and the name of the author. Individual comments within submissions are labelled alphabetically as a, b, etc. Column 4 lists the section of the Draft EIS relevant to the comment; column 5 lists the section of this supplement in which the comment is addressed.

1.2.2 Issues Outside the Scope of the Supplement

A number of submissions made comments on topics that were beyond the scope of the guidelines determined and issued by Environment Australia for the preparation of the EIS. The guidelines are available on the Environment Australia and DEST websites and were included as Appendix A of the Draft EIS. Draft guidelines were published for comment and were finalised following consideration of public comments.

There is no obligation for the proponent to address any comment made on the Draft EIS that was not in the scope of the guidelines (NSG) and they are not considered further than being noted in Appendix B in this supplement. The comments include matters in relation to:

- uranium mining, nuclear power and the nuclear fuel cycle, nuclear weapons and alternative energy
- aspects of the Lucas Heights reactor and its EIS process that are not relevant to the national repository
- aspects of the clean-up of the British nuclear testing sites at Maralinga that are not relevant to the national repository
- debate about the health effects of radiation
- the adequacy of the Commonwealth's environmental legislation or its EIS process
- comments that are assertions or opinions, or simple statements of fact or observation
- comments of a personal or confidential nature or in relation to individuals, or comments about companies or organisations.

Comments on the Lucas Heights reactor and the Maralinga clean-up that are considered to be of some relevance to the national repository EIS are responded to.

Comments that cover topics not included in the guidelines, but which are of relevance to the national repository EIS, are annotated as n.a. (not applicable) in the Draft EIS reference column in Appendix B. These comments include the question of the payment of compensation in the event of an accident and the declaration of 'nuclear free zones' by some councils. These comments are responded to in this supplement, as indicated in the supplement reference column in Appendix B.

1.3 Commonwealth Assessment Process and this EIS

The complete environmental impact assessment process is discussed in Section 1.2 of the Draft EIS and is not repeated here. Comments received on the application of the EPBC Act are addressed below. Comments were also received on the EIS process and on the contents of the Draft EIS and these are also addressed below.

Comments on the adequacy of the Commonwealth's environmental legislation or its EIS process are not within the scope of the guidelines and are not responded to in this Supplement (see Appendix A of the Draft EIS; Section 1.3.2 of this Supplement).

1.3.1 EPBC Act Assessment Process

There should be a public inquiry into radioactive waste management under the EPBC Act.

Inquiries into information used as a base for EISs are rarely used.

The level of assessment required under the EPBC Act is a matter for the Commonwealth Minister for the Environment and Heritage to decide, after a proposal has been referred under the EPBC Act.

The options for assessment provided for by part 8 of the EPBC Act are:

- preliminary documentation
- public environment report
- environmental impact statement
- public inquiry
- an accredited assessment process.

As described in Chapter 1 of the Draft EIS, the Minister for the Environment and Heritage stipulated that an EIS should be prepared for the national repository project.

Why is the proposal not being made jointly with South Australia as allowed under the EPBC Act?

The proposal to build the national repository is in accordance with Commonwealth government policy, has been proposed by a Commonwealth department and, if approved, will be sited on Commonwealth land (following the acquisition of the relevant site by the Commonwealth). The proposal is therefore a Commonwealth action on Commonwealth land. Following referral under the EPBC Act, the Minister for the Environment and Heritage determined that the assessment approach would be by a Commonwealth EIS.

It is strange that the public comments are to be directed to DEST, which is the proponent of the project and the author of the EIS. The submissions should be directed to Environment Australia for consideration and to the Minister for the

Environment for final approval. There is the perception that DEST is controlling the entire process.

Directing comments to the proponent is standard process. The proponent records the submission and forwards a copy to Environment Australia. The proponent then responds to all submissions received by the due date in a Supplement to the Draft EIS. The Supplement is submitted to Environment Australia and released to the public. Environment Australia then prepares its Assessment Report. All three documents (the Draft EIS, Supplement and Assessment Report) constitute the final EIS, which is forwarded to the Minister for the Environment and Heritage for a decision on the project.

The statement that a storage facility is consistent with environmentally sustainable development (ESD) principles and that it will be further assessed when a site is chosen is not considered to be in keeping with the ideals of ESD.

The Draft EIS fails to adequately assess the ESD principles outlined in the EPBC Act.

Nature and future generations are often forgotten: today's economy is insignificant by comparison.

The proposal leaves a problem for future generations to sort out.

The world is turning towards sustainable and ethical technologies and Canberra is swimming against the current.

We need to protect our mother, the earth.

I urge you to do the responsible, safe thing for all our sakes. If you personally had a vision of clean, safe waste management and were able to implement it, what would it be?

The vigilance necessary for ongoing containment of radioactive material is within our capacity and can be developed and sustained by drawing on the cultural and spiritual resources of our human heritage.

The principles of ESD as stated in the EPBC Act are described in Section 1.6.2 of the Draft EIS. ESD in relation to maintaining status quo is also discussed in Section 1.7.1 of the Draft EIS. The EPBC Act has a number of objects, including one specifically in relation to ESD; also it includes five ESD principles:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.
- If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- The principle of inter-generational equity — the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.
- Improved valuation, pricing and incentive mechanisms should be promoted.

The proponent's view, as stated in the Draft EIS, is that the proposed repository addresses the principles of ESD better than the current ad hoc arrangements, and that maintaining the status quo does not provide the best long-term protection of the environment, nor does it address the objects of the EPBC Act in relation to ESD.

After satisfactory completion of the extensive environmental assessment during the current EIS process, which will be the basis of determining the final site, the national repository

project will be further assessed during the licensing process by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

1.3.2 The EIS Process

The Government insults us by telling us to pay for the information (the Draft EIS) on how it proposes to store waste and protect us from potential damage as it is transported across the State. Documents of this nature need to be available at home for reading and reference, rather than reading off a computer at the local library.

I am disgruntled at having to pay for the Draft EIS document.

DEST followed the requirements for public consultation under the EPBC Act in making relevant information accessible to the public. The Draft EIS could be viewed free of charge at public libraries around Australia, and at a number of additional locations in the central–north region of SA and elsewhere.

Free copies of the Draft EIS were distributed to members of consultative committees, professional societies, agencies and environmental groups with an interest in the project.

Copies of the Draft EIS summary were widely distributed free of charge. Free copies were distributed to people who had previously made submissions to discussion papers on the national repository and to people who attended information days. They were also available at the various locations in central–north SA where the Draft EIS was available to be viewed, and during community consultation.

A charge to partially cover the cost to DEST of producing the Draft EIS (and Supplement) is allowed under the EPBC Act. The cost to consumers of the Draft EIS was far less than the cost of production. A CD-ROM version of the Draft EIS, which was much cheaper than the printed version, was also available for purchase. The small charge for a summary obtained from Australian Government Bookshops covered handling fees.

The Draft EIS could also be viewed on the DEST and EA websites. More information on the release and availability of the Draft EIS is provided in Section 1.1.1.

The Draft EIS does not indicate why such a major process is necessary for a repository to hold the low level waste envisaged.

The Commonwealth Minister for Environment determined that an EIS was required for the national repository project.

There can be little faith in the EIS process given that the proponent should organise and pay for the EIS. Hasn't the Government heard of conflict of interest?

As the proponent, DEST is required to provide full details about the proposal including matters that may have the potential to significantly affect the environment in an EIS. A specialist consulting firm, PPK Environment & Infrastructure (now PB), was engaged to produce the EIS.

It is common practice in most countries for the preparation of an EIS to be the responsibility of the proponent. Under the EPBC Act, Environment Australia is required to provide a detailed independent assessment report about the EIS to the Minister for the Environment and Heritage who will consider the report together with input from other sources, before considering whether to approve the proposal and, if so, what conditions to apply. There is no conflict of interest in this process.

I have little faith in the EIS process given that the Government has already decided to go ahead with the proposal, not caring about community concerns, the moral, environmental, cultural, health and safety issues of the Australian people.

I cannot take this EIS seriously given that it was written, will be reviewed and eventually rubber-stamped by the Federal Government.

Environmental assessment under the EPBC Act is described in Section 1.2 of the Draft EIS. The repository project is subject to the, as yet incomplete, assessment and approval process as set out in the EPBC Act and the decision has not already been made to go ahead with the repository proposal.

The EIS will be the primary source of information upon which the environmental impacts of the proposal will be assessed, and will be the basis for an informed decision by the Minister for the Environment and Heritage. It comprises the Draft EIS, this Supplement and Environment Australia's Assessment Report.

1.3.3 The Content of the Draft EIS

You must be complimented on the presentation of the Draft EIS and for the work that has gone into compiling it.

We applaud the thoroughness and rigour of the site selection process for the repository.

I am generally happy with the Draft EIS document and the way it has been set out.

The comments are noted.

The Draft EIS fails to address critical concerns in regards to the indigenous consultation process, environmental and transport issues, and overwhelming community opposition.

The indigenous consultation process is discussed in Section 11.1.1 of the Draft EIS; and Section 1.5.3 and Appendix G describe the extensive consultation in all phases of the project. Environmental concerns are covered extensively throughout the main report and appendices. Transport issues are addressed in Chapter 7. The need for the project is covered in Section 1.6.

'Overwhelming community opposition' presumably refers to an opinion poll taken by *The Advertiser* newspaper, published on 31 July 2000, which concluded that 80% of the people of South Australia oppose the repository. The survey was taken without informing respondents about the options and reasons for having a national repository, the current arrangements for storing waste, and the reasons why the central–north region of South Australia was chosen. It may not have yielded informed views.

There has been no accounting of the social dimensions in the Draft EIS, the social as well as technical aspects to safety analysis, the lack of expertise and experience, the lack of an independent regulator, and the track record of dishonesty and secrecy.

The social impacts of the proposed repository are discussed in Chapter 10 of the Draft EIS, including planning considerations, visual and landscape considerations, land use and demographics, future activity assessment (including access, tourism, pastoral activity, mining and use of the Woomera range), and evaluation of impacts and risks. There is extensive experience available internationally on repository design, and the specialist-developed international codes are quite prescriptive. Those in Government responsible for the project, and the specialist consultants and contractors involved in the project, have experience in relevant areas.

Statements about independent regulation are addressed in Section 3.2. The allegation of dishonesty and secrecy are refuted; the extensive three-phase consultative process on the repository over some 10 years prior to the release of the Draft EIS is described in Sections

1.5 and 5.2 of the Draft EIS. Each of these phases was accompanied by a public discussion paper and followed up with a further report responding to public comment.

The Draft EIS is inadequate with respect to its statutory obligations under the EPBC Act, notably in its failure to adequately describe the design and life-cycle considerations of the proposal. This includes aspects relevant to environmental impact, costs and benefits, security, and potential impacts on indigenous and non-indigenous Australians.

There are many shortcomings in the Draft EIS, which should be reconsidered due to the serious threats to public safety and the environmental stability of the repository.

Many of the concerns raised in our previous submission have not been dealt with and conceivably will not be dealt with until the actual site is chosen.

The Draft EIS is inadequate and misleading.

We are dissatisfied with the way some issues are addressed in the Draft EIS.

The application of the EPBC Act to the project, and the environmental assessment process under the Act, is described in some detail in Section 1.2.1 of the Draft EIS. The assessment process requires the EIS to respond to the guidelines issued by Environment Australia (Appendix A to the Draft EIS). Appendix A also indicates where particular aspects of the guidelines are responded to in the Draft EIS. Environment Australia published draft guidelines for public comment, and finalised them after considering the comments received.

The repository design is covered in some detail in Chapter 6 and the repository design criteria are discussed in Section 5.3. Life-cycle aspects (of the nuclear cycle) are not within the scope of the guidelines. Environmental impacts are addressed throughout the Draft EIS. Benefits are covered in Section 1.6.2, and financial arrangements are covered in Section 6.11. Security is discussed in Sections 6.6 and 12.9. Impacts on indigenous and non-indigenous Australians are covered in Chapter 11.

The vagueness of the Draft EIS in regard to design detail gives rise to uneasiness. It is stated that 'The detail design phase of the project' is not yet available; and 'A suitable cover would be placed over the buried waste.'

There are a myriad unknowns about the project.

It is not a fully considered proposal.

The Draft EIS presents a preliminary design of sufficient detail to assess the environmental and other impacts of the project under consideration. This is standard practice in EIS processes. Detailed design work follows approval of the EIS and is then submitted to the relevant regulatory authorities for approval. An environment management and monitoring plan (EMMP) is also prepared and submitted to the appropriate regulatory authorities.

In the case of the national repository, subject to the approval of the EIS, detailed design approvals would be undertaken as part of the ARPANSA licensing process (see Section 3.3 of the Draft EIS). An EMMP would be prepared before the repository was constructed and began operations (see Section 13.2 of the Draft EIS).

1.4 The Low Level Repository, National Store and High Level Waste Storage

The low level repository will lead to co-location of a store for intermediate level waste and storage or disposal of high level international waste.

The interim store for long-lived intermediate wastes may become a permanent fixture, or a deep underground dump or some other 'purpose-built' facility' may be established.

The Draft EIS does not give any indication about the location of the proposed store for long-lived intermediate wastes. The Commonwealth has given no assurance that the SA community will not have to deal with a second radioactive waste dump in SA, potentially adjacent to Site 52a.

The national store for intermediate level radioactive waste will not be co-located on the same site as the national repository (see Section 1.1 of the Draft EIS). A separate nationwide search has begun to identify a site on Commonwealth land for a national store for Australian long-lived intermediate level waste.

Australia does not produce high level radioactive waste and will not accept the nuclear wastes of other countries for storage or disposal in Australia. The Minister for Science, Peter McGauran, reaffirmed in September 2002 that the Australian Government would not accept the nuclear waste of other countries.

What about storage for long-lived intermediate level waste including spent nuclear fuel reprocessing wastes? Co-location was the 'first siting option', now the Government says co-location is off the agenda but twice this year the Science Minister has refused to rule out co-location.

The Federal Government has been denying the connection between the proposed low level dump and the, so called, intermediate level store but no reasonable person could fail to acknowledge the logic between co-location of radioactive waste. Senator Parer's 18 December 1998 press release mentions co-location but does not say what was to be located with the Woomera dump i.e. long-lived intermediate level waste.

The Commonwealth has failed to resolve the storage and ultimate disposal issues for long-lived intermediate level waste derived predominately from spent fuel from the nuclear reactor.

The Australian Nuclear Science and Technology Organisation (ANSTO) has stated that the proposed Woomera facility would be used for interim storage of spent fuel in the event that overseas storage options fall through. The lack of spent fuel management strategy is the main obstacle in the way of the new Lucas Height reactor.

NSW and SA jurisdictions should have a fully informed and democratic process when considering the siting of a long-lived intermediate level waste store.

A separate nationwide search is being undertaken to identify a site on Commonwealth land for a national store for long-lived intermediate level waste, including the wastes that will arise from the processing of spent fuel from the High Flux Australian Reactor (HIFAR) and the replacement research reactor.

The statement, in February 2001 of the former Minister for Industry, Science and Resources, Senator Minchin, that the national store for long-lived intermediate level waste would not be co-located with the national repository for low level and short-lived intermediate level waste

was confirmed by the Minister for Science, Peter McGauran in 2002 (see Section 1.1 of the Draft EIS).

The selection criteria for the national repository and national store are somewhat different so the best site for the national repository might not necessarily be the best site for the national store. Groundwater and geology are particularly important in the siting of a below-ground disposal facility but not as relevant to the siting of an above-ground storage facility.

There is some probability that a centralised repository for all types of nuclear waste in SA (once existing) would be considered for all types of international waste in the future. While the government of today rejects to take and store foreign nuclear waste for political reasons, it may change its attitude in 5 or 10 years time for political (and perhaps) economical reasons.

There is nothing in the Draft EIS to say that criteria for waste will not change in the future forcing the repository to take different types of waste than originally intended.

As noted in Section 1.1 of the Draft EIS, successive Australian governments have opposed accepting nuclear wastes from other countries for storage or disposal in Australia.

The site for the national repository has been selected according to selection criteria for the disposal of low level and short-lived intermediate level waste in a near-surface environment (Section 5.1 of the Draft EIS). The facility would not be suitable for the disposal of long-lived intermediate level or high level nuclear waste, which would require disposal at depths of typically several hundred metres in a geological repository.

The repository will pave the way for possible future international nuclear waste dump, as has been suggested by companies such as Pangea.

Pangea has now changed its name to Association for Regional and International Underground Storage (ARIUS) and is now openly linking its plans for international waste with Canberra's plans for Australian waste.

The CEO of ARIUS says that 'it is acknowledged that Australia has excellent geological conditions, and therefore Australia could cover the cost of its repository by accepting waste from other countries'. He also says 'Australians will appreciate the high benefits and low risks that would be associated with hosting a well-organised and managed international facility'.

There is a possibility of the dump becoming the thin edge of a more hazardous radioactive waste wedge.

The Government will not allow the nuclear wastes of other countries to be stored or disposed of in Australia. The Government's position is based on the clear principle that countries deriving benefits from nuclear technology should expect to make their own arrangements to safely dispose of their nuclear waste.

Radioactive substances, including wastes, are a prohibited import under Regulation 4R of the Customs (Prohibited Imports) Regulations.

The proposal put forward by overseas-based companies such as Pangea and ARIUS for the siting of a disposal or storage facility for nuclear waste in Australia is in no way linked with the Commonwealth Government's strategy for safely managing Australian radioactive waste.

Government Ministers have confirmed that organisations that may be seen as promoting storage or disposal of international nuclear waste in Australia will not, under any circumstances, be involved in the design, operation or management of Australia's radioactive waste facilities.

1.5 Previous Study Phases – Consultation

The dangers posed by radioactive waste are so serious that any credible long-term management plan must involve a full and comprehensive consultation process with all communities affected.

Consultation with this project has meant visiting an area to consult with the people who will have to live with the results of the outcomes and telling them what you have decided to do, how necessary it is and how it is beneficial to all.

The consultation process was inadequate including poor consultation with local residents.

The Draft EIS pays little or no regard to the wishes of people who live near the proposed sites near Woomera.

A central voice in this discussion must be given to local people and to traditional owners of the land. The claim (page 11 of the Summary) of extensive consultation is not the case and is not independently verifiable. The 'Consultation Processes' listed are information giving exercises and therefore do not qualify as examples of consultation.

The consultation process has been far from thorough given that representatives of the emergency services union and community representatives of the Government's own regional consultative committee expressed their dissatisfaction.

An Emergency Services representative (at the Adelaide Community Meeting on 3 September) stated that their personnel, whilst being responsible for responses in cases of accidents involving radioactive materials, had not been consulted.

The Federal Government did not think that Adelaide was worthy to be included in the consultation process. The committed Adelaide people had to shame them into sending a representative as an example of their 'thorough and transparent' consultation process.

NSW and SA (because it is chosen as the repository site) jurisdictions should have a fully informed and democratic process when considering the siting of a low level repository.

Beware of public relations campaigns masquerading as 'public consultation'.

The Federal Government and the Draft EIS is not serious in addressing community concerns or listening to public opinion.

There has been no meaningful consultation.

Community consultation has been an important issue throughout the formulation of the national repository project, with both a national and regional approach being adopted. The consultation in the previous study phases has been comprehensive, as described in Sections 1.5.3, 5.2 and 7.5 and Appendix G of the Draft EIS. The level of community consultation, and the cities and towns at which consultation was undertaken, were determined in consultation with Environment Australia.

Past experience with community consultation on the project indicated that information days with written information and experts available to answer questions provide a productive and informal opportunity for people to obtain information about the project. As part of the community consultation on the Draft EIS, information days were conducted at Broken Hill

and in central–north South Australia at Port Augusta, Woomera, Roxby Downs and Andamooka. It was impractical to provide information days of this type in Adelaide.

Emergency services organisations around Australia were consulted, and provided the extensive information on emergency services programs, organisation and equipment described in Section 7.6.4 of the Draft EIS. The organisations consulted are listed in Appendix G2.7 of the Draft EIS. In South Australia the SA Metropolitan Fire Services (MFS) and the SA Country Fire Services (CFS) were consulted.

Adelaide was included in the consultation process on the Draft EIS. Copies of the document were available for inspection at a number of venues in Adelaide.

Key groups have been banned from being part of the full debate despite the wishes of many stakeholders. The consultation was selective in membership, not allowing educated independent experts with a contrary view to participate.

Members of the Regional Consultative Committee requested open meetings, media involvement, and representations from environmental groups with independent experts being allowed to attend — this was refused. Members of the committee banned the last scheduled meeting in 2002 as they felt the process was a sham.

The Regional Consultative Committee, whose membership included key regional stakeholders, met from 1998. Only a few members of the committee expressed dissatisfaction with the consultation process and some members chose not attend the last scheduled meeting in 2002. The Commonwealth established a consultation process and made departmental representatives and specialists available for meetings; it was up to members of the consultative committees to decide if they wished to participate in the established consultation process.

Advice that public consultation will occur after the site is determined is unsatisfactory given the sites are essentially all within a small geographical area and that all sites will still necessitate transport through Broken Hill.

The process to determine the proposed region for the national repository is described in Section 5.2 of the Draft EIS. This process, which began in 1992, resulted in the central–north region of South Australia being selected for siting studies in 1998.

The transport route options considered for the national repository, and the route selection principles, are described in Section 7.2.5 of the Draft EIS. One of two possible transport routes to take the waste from Sydney to central–north South Australia would pass through Broken Hill.

An information day was held in Broken Hill in August 2002 as part of the public consultation on the Draft EIS.

In the summary, page 13, on community consultation, there was no mention made of strong opposition to the plan.

Community opposition to the transporting and dumping of nuclear waste has been ignored by the Draft EIS.

The summary states that some members of the community had concerns about the project and that these generally decreased when aspects of the proposal were described and questions answered. Section 1.5.3 of the Draft EIS, which describes community consultation on the project, indicates that a range of views were expressed by people in the consultation process, and that some opposed the national repository proposal.

1.6 Project Need and Justification

It is recognised that there is a need for a national repository to accommodate low level radioactive waste.

It is recognised that there is a need for a sustainable solution to Australia's radioactive waste stockpile problems.

We are concerned that a large amount of radioactive waste continues to be accumulated around Australia, particularly at Lucas Heights.

The current method of storing radioactive waste is both inappropriate, inadequate, and unsafe in the long term. There is a need for a purpose built, secure and safe repository.

It is hoped that the department expedites the building and operation of the repository.

We will all feel guilty, not just the politicians, if we do nothing.

There are sound national interest reasons for establishing the repository to ensure the continuing management of waste, which is of no risk to the public or the environment provided it is effectively stored and monitored.

It is recognised that the medical and other benign uses of radioactive materials, and the waste products associated with these, require environmentally safe and best practice disposal.

These statements are consistent with the stated need for the repository as outlined in Section 1.6.1 of the Draft EIS.

I oppose the Federal Government's plan to construct the national repository.

I am concerned about the Federal Government's plan to construct the national repository.

We are concerned about all levels of nuclear waste.

The proposed waste dump is a quick band-aid solution with no real vision for the future.

A significant number of submissions expressed opposition to the national repository; some were philosophically opposed to the construction of the repository or the generation of radioactive waste, others simply expressed concern, and some were concerned about its location in South Australia or the proposed transport routes.

The proposed national repository is consistent with the previously agreed national (all states and territories and the Commonwealth) approach to establishing such a facility, which began in 1992. This background is presented in the introduction to Section 5.2 of the Draft EIS.

The national repository project has involved assessing land around Australia to identify the best region and site for the facility. The Commonwealth has a responsibility to ensure that the facility is sited in accordance with the relevant technical criteria.

The Draft EIS describes the benefits of the repository, and assesses the potential environmental, social and other impacts of the proposal, in accordance with the EIS Guidelines issued by Environment Australia (Appendix A of the Draft EIS).

The failure of successive Australian governments to resolve waste management issues, prior to approving developments (which will increase Australia's radioactive waste levels) is counter to sensible planning and ESD principles.

There has been clear difficulty in siting a low level repository over the last several decades.

Australia's burden of radioactive waste is miniscule by comparison to USA and elsewhere and yet is proving to be extraordinarily difficult to resolve.

The deficiencies with the current Australian Government's approach to radioactive waste management were criticised in previous inquiries.

The Australian Labor Party is opposed to this proposal and the possibility of co-location with a high level waste dump; their policy also supports the wishes of the South Australian Parliament to legislate against the proposal. The Australian Democrats nuclear policy supports 'the safe, above-ground, storage and limited transport of nuclear waste'. The Australian Greens are also opposed to the proposal and support 'the encouragement of avoiding waste as well as reducing and reusing at both the manufacturing and consumer levels'. They are also opposed to this method of centralised storage. This project only has the support of one of our major political parties.

As described above, the proposed national repository is consistent with the previously agreed national approach to establishing such a facility, which began in 1992 (under a Federal Labor Government) (see the introduction to Section 5.2 of the Draft EIS).

The national repository project has involved assessing land around Australia to identify the best region and site for the facility. The Commonwealth has a responsibility to ensure that the facility is sited in accordance with the relevant technical criteria, in particular the criteria specified in the National Health and Medical Research Council (NHMRC) 1992 *Code of practice for the near-surface disposal of radioactive waste in Australia* (NHMRC 1992 Code).

There has been extensive consultation with the community throughout the siting process (see Section 5.2 of the Draft EIS).

The Draft EIS fails to clarify why such materials could not be adequately and safely disposed of at most municipal landfills given some provision of security.

It is correct that some of the low level waste (in particular the contaminated soils) is of low enough activity that it could be safely disposed of in municipal landfills. However, disposal in a municipal landfill would require additional testing and procedures to determine which materials were suitable for landfill disposal, and additional approvals would need to be obtained. Disposal in a municipal landfill may also raise some unnecessary public concern.

The proponent's view is that disposal of all of the current material in the existing low level and long-lived intermediate waste inventory in a purpose-built repository, with its monitoring and other safeguards, is preferable.

The South Australian Government strongly opposes the establishment of a national low level and short-lived intermediate level radioactive waste repository in South Australia.

The SA public have consistently opposed the dump. Undemocratically, the dump may be approved against the wishes of the vast majority of South Australians and the State Government.

Many generations of South Australians will be affected by the consequences of this project and it should be carried out with unbiased community and scientific consultation.

Responsible management of Australia's radioactive waste must include community consensus. Both the people and Government of South Australia oppose the project. The Federal Government must respect the clear community and Government opinion on this matter.

I oppose the Federal Government's plan to establish, or rather impose, a radioactive waste dump in SA.

Community and local government have consistently stated their opposition to this project yet their voices are not being respected and they remain targets for contamination.

There is no community consensus for the project.

The South Australian Government no longer agrees with the national approach to establishing the national repository (see above and introduction to the Draft EIS).

The states and territories supported the concept of a national repository and the implementation of a nationwide search for a site based on international selection criteria adapted for Australia's circumstances. The principal reason for this support was that it does not make sense technically and economically for each Australian jurisdiction to establish its own facility for the small amount of radioactive waste that Australia holds.

The national repository project has assessed land around Australia to identify the best region and site for the facility. The Commonwealth has a responsibility to ensure that the facility is sited in accordance with the relevant technical criteria.

The approach by the South Australian Government has changed with a change of Government. The current Labor Government does not support the construction of a national repository.

The South Australian Government's position does not take into account the benefits South Australians receive from the use of radioactive materials in medicine, industry and research, and the benefits that would result from use of an approved site for the disposal of the radioactive waste currently stored in some 26 locations in the State, and from the appropriate disposal of radioactive waste likely to arise in the State in the future.

The South Australian Minister for Environment has reportedly stated that, while the South Australian Government's policy was to reject a national repository in South Australia, it would be 'practical' to use it if it went ahead (*The Advertiser*, 13 November 2002).

The State Government has introduced and passed through the South Australian House of Assembly the Nuclear Waste Storage Facility (Prohibition Amendment) Bill 2002. This Bill will see the State's opposition to a national radioactive waste repository in South Australia put into legislation and will provide the Commonwealth with a clear signal on the views of the South Australian Parliament on the establishment of a proposed national facility in South Australia.

Existing Commonwealth legislation (the *Australian Radiation Protection and Nuclear Safety Act 1998* (ARPANS Act)) would have precedence over any state legislation, to the extent that they are inconsistent. As of 25 November 2002, the Nuclear Waste Storage Facility (Prohibition Amendment) Bill had not been passed by the South Australian Legislative Council.

Without the new reactor in Sydney there would be no need/pressure for a waste dump. Rather than imposing radioactive waste dumps on unwilling communities the Federal Government should be supporting non-nuclear alternatives and actively reducing the amount of this waste in Australia.

The need for the repository is not driven by safety, it is driven by the politics of attempting to build a new nuclear reactor at Lucas Heights. Without a new nuclear facility in Sydney, this repository would not be required.

The need for the national repository is driven by the need to get Lucas Heights waste off site, as well as servicing Australia's foreign policy.

In the mid-1980s, well before the 1997 decision to proceed with a replacement research reactor, all Australian governments agreed that a national repository was required for the disposal of Australian low level and short-lived intermediate level radioactive waste (Section 5.2 of the Draft EIS).

The current project to site the national repository began in 1992, also before the decision on a replacement research reactor. Australia needs a national repository to manage its existing and future waste, which will continue to be generated from research, industrial and medical usage of radioactive materials, regardless of whether or not there is a replacement research reactor.

Radioactive waste stored in hospitals, industry and smaller research institutions poses the greatest potential difficulties for management in the long-term. This is because the waste is largely stored in non-purpose built facilities and administrative arrangements are not in place for monitoring and security in the long-term. Disposal of radioactive waste in a purpose-built national repository would ensure the safe isolation of the waste from people and the environment until its radioactivity approaches background levels.

Much of Australia's existing inventory of radioactive waste (Section 4.1 of the Draft EIS) has been derived from the past use of radioactive materials in medicine, industry and research. Many of the items, such as exit signs, which contain tritium, are no longer generated. In fact, many radioactive sources used in medical and industrial equipment are now recycled but some residual radioactive materials cannot be managed this way. About 40 m^3 of waste will be generated in Australia each year in the future (Section 4.2 of the Draft EIS).

The Commonwealth Government agrees that alternatives to the creation of radioactive waste should be encouraged where feasible and that there should be incentives for the minimisation of radioactive waste production. There will be fees for the disposal of waste in the national repository to encourage waste minimisation (Section 6.11 of the Draft EIS).

Dumping of radioactive waste is not consistent with a clean and sustainable future for Australia.

I believe environmental and social hazards will be created for generations to come.

I believe that the location of a nuclear waste dump in our state will have implications for the health of South Australians.

Waste disposed of in the repository will be appropriately conditioned and packaged, and the packages arranged in disposal trenches or boreholes (see Chapter 6 of the Draft EIS). The location of packages and the waste contained in them will be well documented, and the site monitored and regulated for the period of its operation and for 200 years after its closure (the institutional control period), at which point the site could be returned to other land use.

As discussed in Section 1.6 of the Draft EIS, the proposal to dispose of waste in a purpose-built, national repository better addresses the objects of the EPBC Act, the principles of ESD and the principles of protection of the environment and people, than the current ad hoc arrangements.

The potential future radiological impacts and risks were addressed in detail in the Draft EIS, in Section 12.8 and Appendix E8. A broad range of environmental and social scenarios were considered, and release pathways into the environment and the potential for human exposure were assessed.

Overall it was shown that risks that might arise in future years, when the site is no longer under institutional control, are acceptably low and in accordance with the NHMRC 1992 Code.

The Federal Government should support non-nuclear alternatives rather than create more waste.

Many of the isotopes used in medicine, industry and research can only be produced by a research reactor. There is no economically viable alternative to the use of radioactive materials in some applications. In the case of medicine, radioactive materials are essential for a range of diagnostic and therapeutic procedures but their use inevitably generates some radioactive waste.

The safety benefits derived by the community from, for example, the most reliable and cost-effective type of smoke detector, which makes use of small quantities of radioactive americium, are also considerable. Because of its effectiveness and low cost, it has been widely accepted by the public and can now be found in most Australian homes.

Australia does not have nuclear power and is unlikely to in the foreseeable future, given our large reserves of fossil fuels. The Commonwealth Government is committed to promoting the use of renewable energy sources and technology. Further discussion on the use of alternative energy, and future waste generation, is provided in Section 4.2 of this Supplement.

1.7 Alternatives to the Proposal

Several state governments have proposed alternative facilities that better facilitate the safe management of hospital and industrial waste.

Several Australian states presently operate facilities for the management of radioactive waste resulting from government, medical and industrial use e.g. Queensland's Esk Radioactive Waste Storage Facility, Western Australia's Mt Walton Intractable Waste Disposal Facility and NSW Lidcome Hazardous Waste Depot. South Australia is currently proposing to establish a facility under SA EPA Control. These facilities should be updated and regulated to store the radioactive waste in question.

While Western Australia has a disposal facility for intractable waste, including radioactive waste (Mt Walton East), no other state or territory has or is planning to establish a disposal facility. Queensland has a purpose-built store at Esk; low level and short-lived intermediate level waste stored in this facility will be disposed of in the national repository. Information on both of these operations is provided in Section 2.4 of the Draft EIS. South Australia is currently undergoing a review of its current waste management situation, but no alternative facility has been proposed.

The burial of low level radioactive material under the Olympic Dam mine material (the mines are many hundreds of metres deep) could be an alternative to a near surface repository. Low level radioactive waste could be mixed with cement and waste rock and backfilled into mined-out stopes at Olympic Dam, which would cost almost nothing because the backfill is required anyway. This suggestion is a morally sound alternative to the pristine Site 52a, as the Olympic Dam ore body is naturally radioactive; hence the radioactive waste is unlikely to cause significant impacts. The radioactive ore that has been removed from the mine would be far more dangerous than the low level waste that is proposed for the repository.

The repository does not consider mining waste, perhaps in this case radioactive waste is best stored with it.

Radioactive waste could be stored in the mined-out areas of Broken Hill.

The Commonwealth Government considered the siting of the national repository in a disused or operating mine (see Section 1.7.2 of the Draft EIS).

The technical difficulties of stabilising the disturbed rock strata that are typical of a mined environment to ensure the long-term physical integrity of the facility, combined with the licensing, regulating and monitoring difficulties associated with such a site, do not make such an option attractive.

In addition, the use of an operating or disused mine could limit future exploration activities and cause operational difficulties if future generations decided to activate mining operations in new areas within the mine as a result of changed economic conditions.

Site selection for the national repository has followed both Australian and international guidelines. Mines typically did not meet repository selection criteria, as ore deposits are typically located in fractured rock.

The Draft EIS does not consider the first Australian State Government approved, legislated and gazetted, low level radioactive waste repository in Radium Hill, which has been used since February 1981. Radium Hill has the following advantages: it meets the site selection criteria set out in the Draft DIS; it would be accepted by the public since it is not a new radioactive site; the remaining uranium bearing one is very low grade and uneconomical to mine; it is not subject to Native Title claims; it was not affected by a 250 mm plus deluge of rain that fell there over 24 hours in 1997; it is about 500 km closer to the main radioactive waste generation centres than the sites proposed in the Draft EIS; and it would provide employment opportunities for local and Broken Hill people.

Section 1.7.2 of the Draft EIS addresses why disused or operating mine sites, including Radium Hill, are not suitable for the siting of the national repository.

The SA Government used an above-ground area within a stockpile of sand at Radium Hill in the 1980s dispose of small quantities of mining ore samples. This site does not meet the design requirements for near-surface disposal of low level and long-lived intermediate level radioactive waste, as the waste is buried within an artificial mound, and there is potential for erosion and risk of intrusion by people and animals.

Such disposal would not be suitable for much of the waste destined for the national repository (see Section 5.3 of the Draft EIS for repository design criteria).

Each state should take responsibility for the storage of their respective radioactive waste material produced.

None of the other states are asking SA to take their waste.

Each state should have its own low level waste repository.

The small amount of medical and other low level waste can be managed properly by each state in a location or locations rather than have each producer having to contain it 'on the premises'. If each state managed it, the amount of waste produced would be the responsibility of each state.

Technically and economically, for the small amount of radioactive waste that Australia has, it would be inefficient and against common sense for each state and territory to establish its own disposal facilities. Highly suitable sites would not be available in all states and territories and the cost involved in establishing each facility would be millions of dollars for each jurisdiction. Even if each jurisdiction were to deal with its own waste, the Commonwealth would still need to find a site within a state or territory for disposal of its waste. This would result in Australia having up to nine disposal facilities for only 3700 m^3 of existing low level and short-lived intermediate level radioactive waste.

We encourage production of fewer waste products in other areas, why not in waste uranium?

Australia produces a small amount of radioactive waste, and recycling of sources is encouraged where possible.

A charge would be set for disposal of waste at the national repository to encourage radioactive waste minimisation (Section 6.11 of the Draft EIS).

Waste uranium arising from the extraction of uranium from ores is disposed of at the relevant mine site. Mining wastes will not be disposed of in the national repository.

The alternative procedure suggested is to store the waste where it was and is being produced. This request has been made in the past by many environmental organisations. The Government has responded to this request in the Draft EIS by arguing that such a solution would be 'inefficient and would mean an unnecessary use of resources'. However no proof for this statement is given.

We support the position that radioactive waste is best managed close to its source of production where the expertise is on hand and readily available.

Radioactive waste is best managed close to its source of production where the minimisation of waste is assured.

Radioactive waste should stay where it is produced and should not be moved.

The 2010 m^3 (approximately 54% of the national total of 3700 m^3 of low level radioactive waste) presently stored at Woomera can be suitably stored on the existing site using an above-ground storage strategy.

The cost of upgrading the present storage facilities for this material should be borne by the Federal Government. Continuing maintenance and, as necessary, enlargement of those storage facilities should become part of the recurrent budget responsibilities of the organisations producing the materials.

The Draft EIS states that 'storing such waste in many locations in non-purpose built facilities potentially poses greater risk to the environment and people than disposing of the material in a national purpose-built repository where the material can be safely managed and monitored'. No evidence has been provided for this assertion. Current storage locations be further updated and regulated to provide purpose built facilities, this would avoid problems of transportation, safety and environmental risks.

The Draft EIS states the long term disadvantages of storing radioactive waste at the site of waste generation (in Section 1.6.1). Radioactive materials and sources are used for medical, industrial or research purposes at a large number of locations around the country.

To adopt the approach suggested would require storage facilities to be maintained for relatively small amounts of waste at each site. Individual sites would need to meet defined design and security criteria at significant cost, and implement an approved EMMP. They would also require access to technical expertise in the storage of radioactive waste, which would pose difficulties for some industrial and commercial operations.

A licensing system with a regular inspectorial, monitoring and audit process would need to be established at each individual site to ensure the proper long-term management and custodianship of the wastes held.

Maintaining such a large number of approved storage facilities over a long period of time would be very costly, with reduced guarantee for the occupational and public safety and security of the materials than in the national repository proposal.

The disposal of low level and short-lived intermediate level radioactive waste in a purpose-built facility is the environmentally responsible approach to the management of this material.

Above-ground storage would allow for access and regular monitoring, waste would be dry and the risk of transport accidents and contamination would be reduced. Waste would also be close to experts and be easily guarded.

Above-ground storage is not the most appropriate way to manage our low level and short-lived intermediate level waste in the long-term. Accepted international practice is for the disposal of this type of radioactive waste in shallow-burial facilities.

Australia has suitable sites for shallow-burial of low level and short-lived intermediate level waste in the remote, stony desert of central–north South Australia, where the underground water is deep (and not connected to the Great Artesian Basin nor near the Murray–Darling Basin), and is so highly saline that is unsuitable for use by humans or animals, or for use in agriculture. The geology of the sites and low annual rainfall provides further protection against contamination.

The national store for long-lived intermediate level radioactive waste will be a purpose-built, above-ground facility and it is the Government's intention that the waste will be stored so that it can be safely retrieved and disposed of at a later time. Above-ground storage isolates the radioactive waste, provides protection for people and the environment, and facilitates control while allowing time for a geological repository or other suitable facility to be developed, for ultimate disposal of the waste.

International best practice has shifted to the concept of above-ground storage in 'assured isolation facilities'. Above-ground storage was also formally recommended for use in Australia by the Senate Committee Report* No Time to Waste *(1996).

It is not accepted that 'assured isolation facilities' are international best practice. These facilities have been proposed as an alternative to near-surface disposal in the United States where commercial operators are involved. They have not been introduced elsewhere as a suitable option for long-term management of radioactive waste.

Near-surface disposal structures also vary depending on the environment in which they are sited (see Section 2.5.2 of the Draft EIS). Most countries have near-surface disposal for their low level and short-lived intermediate level waste. Disposal structures built above-ground because of high groundwater levels or where groundwater is suitable for agriculture and human use are intended to be mounded-over during closure to create an artificial hill.

In order to avoid the hazards of transporting waste, an above-surface repository should be built near Lucas Heights.

The low level and short-lived intermediate level radioactive waste to be transported to the repository would be in solid form only. Before transportation the waste would be packaged in accordance with the relevant national and international requirements for transport of the relevant class of waste to ensure minimal radiological hazard associated with the waste.

The transport of radioactive materials around the world has an outstanding safety record. An estimated 20 million packages containing radioactive material are transported around the world each year. In 1996, the Department of Transport advised a Senate Select Committee that there had been no significant incidents in the transportation of radioactive materials during the previous 30 years. There have been no significant incidents since that date.

Accordingly, the risks associated with transporting the waste to the repository would be fewer than the risks associated with transporting packages of flammable or toxic material over similar distances. In the unlikely event of an accident during transportation, the major hazard, by far, would arise from the dissipation of the kinetic energy of the vehicle that was carrying the waste. There would be minimal hazard from the radioactivity of the load. In the even more unlikely event that transportation packages were breached in an accident, the

hazard would be, at most, low, and, as the waste would be in solid form, the clean-up would be straightforward.

The national repository is for the disposal of waste from all states and territories (Western Australia, however, manages its own waste and is expected to continue to do so). Low level and short-lived intermediate level radioactive waste is most appropriately disposed of in below-ground, near-surface repositories. Wherever the national repository is located there will be a need to transport waste to the site.

Along with the rest of Australia, the suitability of the region near Lucas Heights was considered during the national repository site-selection process. It was considered unsuitable for the national repository because it does not satisfy a number of the site selection criteria (listed in Section 5.1.1 of the Draft EIS). There are also legislative impediments to establishing a national repository at the site of the Lucas Heights Science and Technology Centre, where the HIFAR research reactor is located.

An alternative method for the repository could involve sinking a vertical shaft to a suitable length that would allow for numerous drives to extend at various levels from the shaft (radiating like spokes of a wheel). This would allow comparable waste materials to be permanently placed and stored at various levels. This option would be more expensive than the proposed design but would offer greater security and long-term benefits.

The facility described is a type of geological repository that would be suitable for long-lived intermediate waste. It is not necessary for the type of waste to be disposed of in the national repository, due to its level of radioactivity and the nature of the waste. However, the use of vertical boreholes of up to 20 m in depth is one possible option for the disposal of small volume sealed sources and is under consideration for the proposed national facility (see Section 6.2.3 of the Draft EIS).

Rather than rejecting the proposal, I wish to provide an alternative. Most nuclear reactors around the globe should be decommissioned and the United Nations should become an overseer to one site that is decided upon collaboratively by global decision makers. This would involve one reactor to continue nuclear and medical research that would be staffed on a roster basis by all capable nations. Research would benefit all people and the waste from one site would be shared around the world. Surely the United Nations can fund an idea similar to this? I acknowledge that this is a long-term initiative however in the short term neither my partner nor I want nuclear waste at all in South Australia.

This proposal is somewhat impractical given the global medical and industrial use of radioactive isotopes. Furthermore, it would appear to still require Australia to accept and dispose of its share of the waste generated.

It is stated in the Draft EIS that waste will be stored in ceramic containers called Synroc. These jars must be handled with great care, since Newcastle is living testimony that nowhere is safe from earth crust movement.

The Draft EIS does not state that Synroc would be used; it notes that Synroc can be used, instead of cement or glass, to act as binding material to encapsulate long-lived (or high level) radioactive waste. The resulting material still needs to be disposed of in a repository appropriate to this class of waste. It is not cost effective to use a material such as Synroc for encapsulating low level or short-lived intermediate level radioactive waste.

Chapter 2

Radiation, Radioactive Waste and Waste Management

2.1 Radiation and Radioactivity

Thirty year half-lives are often referred to, but the 'half-life' is not in fact half the length of time taken for the radioactive threat to subside. It may be that a 30-year half-life equates to over 400 years before the waste is completely safe and not emitting radiation.

Can we contain such toxic waste for the millions of years I am sure it requires without it having a significant environmental effect?

Radioactive waste is dangerous now and will still be dangerous in tens of thousands of years.

What happens to the waste over 20,000 years? Will you still be around then to assure us?

The half-life refers to the time for half of the quantity of the radionuclide under consideration to decay. For a quantity of a radionuclide with a 30-year half life (the typical half-life of low level waste), after 30 years half of the original amount of radionuclide would remain, after 60 years one quarter would remain, after 90 years one eighth and so on. After 200 years (the institutional control period) about 1% of the original would remain and after 400 years about 0.01% of the original would remain.

A 200-year institutional control period after closure of the repository, during which access to the site would be restricted, would be more than adequate to allow the radioactive materials to decay to such a level that the site could safely return to other uses.

There has been concern regarding the comments in the Draft EIS on ionising power, for example the comment that bond breaks do not matter to the function of the body.

Different molecules are broken by different frequencies — how much is known about this?

There are debates over the health effects of radiation.

The effects of radiation on humans are discussed in Section 2.1 of the Draft EIS. Radiation attenuation rates (or the rate at which radiation decreases) depend on the type of radiation released by each radioactive element. The inventory that is proposed for the repository is known, hence the types of radioactive materials involved are known. The strength and penetrating capability of each radionuclide's emissions and their interaction with matter are fundamental physical properties that are also well established.

Each type of radiation, for example, alpha particles, beta particles and gamma rays, can be managed in different ways to ensure safety:

- Alpha particles can only travel a few centimetres in air and can be stopped by a sheet of paper or a layer of skin.

- Beta particles can travel several metres through the air, or several millimetres into the human body, but can be stopped by a small thickness of light material such as aluminium or plastic sheeting.
- Gamma rays are a type of electromagnetic radiation similar to X-rays that can pass right through the human body but can be stopped by lead or walls of concrete.

The containment of radionuclides in the repository together with the radiation shielding provided by the in-ground burial, overburden and specialised cover materials will ensure that the exposure to radiation from the facility is kept within the accepted safe levels allowed for by regulation. They will also ensure the safety of both the general public and on-site personnel, who will often be working at the repository during disposal campaigns. Additional safety is provided by the solid waste form and specialised packaging for the waste, which will contribute to the containment of the radionuclides and radiation shielding.

Debate about the health effects of radiation is beyond the scope of the EIS.

Page 4 of the Draft EIS Summary lists the penetrating power of each of the 4 kinds of rays or particles but does not measure the ionising power of these or indicate ranges with respect to ionising power.

Ionising power depends on the energy of the particular type of radiation. Of the radiation types considered here, the range of energies is similar. However, the intensity of the ionisation depends upon the distance over which this energy is deposited, that is the penetration of the radiation. The relative penetration of the radiation through the same material relates to the mass and electrical charge of the radiation.

The relatively large atomic alpha particles travel very short distances and, in doing so, lose their energy in a short distance causing much ionisation. At the other extreme, gamma rays are electromagnetic radiation with negligible mass and no charge and therefore have a high penetration of materials. Because the total energy is deposited over a longer distance the ionisation intensity is less than particulate forms of radiation. Neutrons have a low mass and no electrical charge and therefore are highly penetrating but cause secondary radiation due to interaction with the atoms of the material.

It is estimated that natural radiation levels have doubled since the 1950s.

There is no evidence of any increase in background radiation levels.

2.2 Uses of Radioactivity

The Draft EIS provides no discussions of alternatives to the replacement of the Lucas Heights reactor, for example, the use of cyclotrons for medical radioisotopes, or importing medical isotopes. Over 90% of medical radioisotopes required in Australia could be prepared by using cyclotrons and importing the others. If cyclotrons were used then the need to transport and bury wastes from the Lucas Heights reactor would be unnecessary.

An example of a specific fib is the government and ANSTO claiming that Australia needs a new reactor because the most important medical isotope, technetium-99m (^{99m}Tc), has a half-life of 6 hours and therefore cannot be imported. While this is true, ^{99m}Tc can easily be extracted from a solution of the longer-lived parent isotope molybdenum-99m (^{99m}Mo). ^{99}Mo is imported into Australia every week. About two-thirds of all nuclear medicine procedures use ^{99m}Tc drawn from imported (^{99m}Mo).

The importance of satisfactory isotope supply for medical and industrial purposes is acknowledged.

Australia's requirements for isotopes for medical and industrial purposes can and should be met by (a) local production in cyclotrons and spallation sources, and (b) importation of some isotopes such as technetium/molybdenum which currently require reactor production. Expansion of the range of isotopes generated in local non-reactor facilities should be promoted through dedicated research and development programs.

Alternatives to the replacement of the Lucas Heights reactor are outside the scope of this EIS (as defined by its guidelines) but the following brief response is provided. This issue was addressed in some detail in the EIS on the Replacement Nuclear Research Reactor.

Most medical radioisotopes can only be produced, in commercial quantities and at the required activities, in either a nuclear reactor or a cyclotron. However, few can be produced in both and thus both a reactor and several cyclotrons are needed to make the full range of radioisotopes required for medicine. Cyclotrons are already used in Australia to produce specific medical isotopes but they cannot produce the complete range of medical isotopes used in Australia today.

Both cyclotrons and the research reactor produce radioactive waste that must be managed responsibly.

Currently around 80% of all nuclear medicine procedures in Australia use the radioisotope ^{99m}Tc, which is the daughter radioisotope resulting from the decay of ^{99m}Mo produced in ANSTO's HIFAR reactor. ^{99m}Mo is not produced on a commercial basis in cyclotrons anywhere in the world.

The Australian Academy of Science concluded in 2001 that no accelerator-based alternative technology could meet Australia's requirements either for nuclear-based science or for the production of medical radioisotopes. In addition, the majority report by the Senate Select Committee for an Inquiry into the Contract for a new reactor at Lucas Heights (2001), stated: 'In summary, the committee accepts that, at the moment, nuclear reactors will continue to be the only feasible source of neutrons for the manufacture of technetium-99m and that it is unlikely that anything will compete with the reactor produced molybdenum-technetium generator in the near future' (p 67).

Australia will need a national store and national repository to manage its existing and future waste regardless of whether a replacement reactor or a cyclotron is used to supply medical isotopes. Moreover, the generation of radioactive waste is a consequence of activities accepted in the community as being beneficial in terms of their contribution to human health and safety, environmental protection and scientific research.

The Draft EIS ignores negative aspects of use of radioactive materials, for example the dangers of nuclear medicine (people not necessarily benefiting from medical procedures), the risk of overexposure, accidental contaminations, environmental degradation, transportation accidents and pollution to waterways. It is misleading of the Draft EIS to insinuate that ever-increasing nuclear medical procedures are necessarily of benefit to patients.

There are risks associated with the use of radioactive materials. The general dangers of radiation are addressed in Chapter 12 of the Draft EIS, which includes discussion of safe levels of exposure to the public, and consideration of likely impacts and risks of exposure during construction and operation of the national repository.

The location and design of the repository site and its operation means that it is very unlikely that the general public would receive any exposure to radiation from the facility. By the end of the institutional control period (200 years after closure) the radioactivity of the buried waste would have decayed to such a level as to safely allow unrestricted land use at the site.

One of the fundamental principles upon which the international system for radiation protection is based is that there must be a net benefit from a practice that might lead to radiation exposure or other detriment. Therefore any uses of radioactive materials would

have to be justified and radiation risks reduced to as low as reasonably achievable (the ALARA principle; see Section 3.1 of the Draft EIS).

The purpose of the EIS is not to justify the use of radioactive materials and sources in a variety of applications in medicine, industry and research, but to demonstrate that low level and short-lived intermediate level radioactive waste arising from those practices can be dealt with safely and with no significant environmental impact. The alleged dangers of nuclear medicine are not within the scope of the EIS for the national repository.

Dangers posed by radioactive waste are serious and require a halt to the production of radioactive waste from the existing and proposed reactor in Sydney.

Radioactive waste produced at Lucas Heights is derived from the production of radioactive materials, which are used beneficially in medicine, industry and research.

Low level and short-lived intermediate level radioactive waste can be safely disposed of and managed in near-surface repositories (see Section 2.5 of the Draft EIS). Radioactive waste can also be safely managed during transport in accordance with the ARPANSA 2001 *Code of practice for the safe transport of radioactive material* (ARPANSA 2001 Code) and relevant regulations (Section 7.2 of the Draft EIS).

The low level and short-lived intermediate level radioactive waste generated from the existing and proposed reactors in Sydney can be safely disposed of along with the radioactive waste generated elsewhere in Australia. HIFAR produces a small amount of this waste each year, about 30 m^3. The replacement research reactor is expected to generate a similar amount of waste.

Long-lived intermediate level radioactive waste derived from the existing and replacement research reactors in Sydney will be safely managed in the national store.

What is the likelihood that nuclear power reactors could operate in Australia (and hence generate high level waste) — if so what would happen to the waste?

The Commonwealth Government considers that nuclear power will not be viable in Australia in the foreseeable future. Australia has large reserves of fossil fuels, which provide a relatively cheap source of energy.

There is a significant increase of interest in renewable energy generation, and the associated product and service spin-offs, which use renewable energy sources and technology. With a focus on renewable energies, it is even more unlikely that nuclear energy will be a power source in Australia in the future.

There are alternatives to providing energy to the Australian population that do not provide such irreversible damage to our environment and health.

Radioactive waste produced in Australia is derived from the production and use of radioactive materials, which are used beneficially in medicine, industry and research. Radioactive waste is not produced in Australia as a result of the generation of energy.

2.3 Radioactive Waste Classification

The Draft EIS main report states in paragraph 2.3.3 that 'Australia does not generate high level waste and thus has no need or responsibility to store or dispose of any such material'. This statement is misleading and false. The controlled chain reaction in the core of the Lucas Heights research reactor is the same as in large nuclear power reactors and the nature of the fission products generated by irradiation is the same waste as well. The numerous spent fuel rods already sent overseas and the over one thousand rods currently being stored at Lucas Heights awaiting being sent

to reprocessing plants will eventually have to be taken back in the form of concentrated highly active waste (vitrified high level waste at the very best). This type of waste together with dismantled reactor waste remains hidden in the 'intermediate level waste' category of the Draft EIS.

As noted in Section 2.3 of the Draft EIS, Australia does not generate high level waste consistent with international standards. The waste returning to Australia from the processing of research reactor spent fuel overseas will be classified as long-lived intermediate level waste. This waste will not be disposed of in the national repository but placed in the national store.

The statement that no high level waste is generated in Australia is misleading.

High level waste is defined in Section 2.3.3 of the Draft EIS. This definition corresponds to International Atomic Energy Agency (IAEA) Safety guidelines. Australia does not produce this type of waste.

The latest waste classifications from the government leave wriggle room. For example, low level waste is said to include 'low levels of beta and gamma emitting, and normally very low levels of alpha emitting, radioactive material'. What is 'low' level or a 'very low' level and who decides? What is meant by the 'normally'? There is no agreement within the department or with other Australian nuclear organisations as to the definition of various levels of categories of waste.

The Draft EIS uses inconsistent definitions of various levels or categories of waste.

There need to be clear definitions of the repository's radioactive waste so that the public can be truly informed of its risks and waste category (according to the NHMRC 1992 Code).

The Government has avoided defining low level, intermediate level and high level waste in terms of activity (e.g. Curie units) in the Draft EIS and allows the incorporation of high level waste into intermediate level waste.

The definition of radioactive waste as used in the Draft EIS is based upon the internationally accepted classification of waste defined by the IAEA. High level waste is usually derived from reprocessing spent nuclear fuel and is characterised by the heat generated by radioactive decay in the waste. Low and intermediate level waste is associated with insignificant heat generation, and is subdivided into short-lived (half-life less than 30 years) and long-lived (significant levels of radionuclides of half-life greater than 30 years).

Quantitative activity limits are normally avoided in the general classification of radioactive waste because specific limits are dependent on the method of disposal of the waste and the design of the disposal facility. Quantitative waste acceptance criteria are generated from a detailed safety assessment of a repository taking into account site-specific factors.

The NHMRC 1992 Code, upon which the design of the proposed national repository is based, lists generic concentration limits for key groups of radionuclides. The derived limits in the NHMRC 1992 Code for long-lived alpha emitting radionuclides are considerably less than beta/gamma emitting radionuclides.

2.4 Waste Management in Australia

The formulation of policies governing the management of radioactive materials requires full participation of the public. Free circulation of information and open communication are indispensable for the self-protection of present and future generations.

Policy documents, such as the NHMRC 1992 Code, are developed using a public participation process.

In the case of the national repository, there has been an extensive three-phase consultative process on the repository over the 10 years before the release of the Draft EIS (see Sections 1.5 and 5.2 of the Draft EIS). Each of these phases was accompanied by a public discussion paper and followed up with a further report responding to public comment. Extensive field work and investigations were undertaken during this process.

An example of radioactive waste management Canberra style is the comment of a senior government bureaucrat that spent nuclear fuel is 'an issue for another generation … Someone else can worry about it' (ABC Radio National, Background Briefing, 29 March 1998).

Spent nuclear fuel or waste arising from its processing will not be disposed of in the national repository. As noted above, waste derived from the processing of spent nuclear fuel from the HIFAR and replacement research reactor will be stored in the national store. A site selection study for the national store is currently underway.

The Commonwealth's plans for disposal of Australia's existing and future low level and short-lived intermediate level waste in the national repository are fully outlined in the Draft EIS.

Shame on ARPANSA and the Government for allowing the radioactive waste situation to become as bad as they now portray it to be.

States and territories are responsible for radioactive waste management in their respective jurisdictions. ARPANSA has responsibility for the regulatory aspects of the management of radioactive waste by Commonwealth agencies.

Current storage arrangements are inadequate from a long-term point of view and that is why the national repository project is being progressed by the Commonwealth. The scientific assessment, community consultation and regulatory approval process has been exhaustive and lengthy to ensure that the facility is safely and responsibly sited and established.

There have been concerns that the Government does not have a comprehensive radioactive waste management plan.

The Commonwealth Government has a comprehensive, integrated plan for the safe management of Australia's radioactive waste. This plan involves the development of a national repository to dispose of low level radioactive waste and a national store for the storage of intermediate level radioactive waste. In the future a permanent disposal facility for intermediate level radioactive waste will need to be developed.

Australia does not generate any high level radioactive waste and there is no need or responsibility to store or dispose of any such material in Australia.

Both the national repository and the national store are designed to improve upon the current storage arrangements that individual waste producers have in place around the country.

On the strength of the Maralinga precedent, the Woomera dump is certain to be mismanaged and there is no independent regulator.

The plan for a dump at Woomera should be cancelled and Maralinga cleaned up properly instead.

The Maralinga Rehabilitation Project to clean-up the main test sites at the former British atomic test site was successfully completed in 2000. The conditions for the Maralinga clean-up were established taking into account the lifestyle of the traditional owners, and are consistent with the IAEA guidelines for interventions of this nature. Discussion of the Maralinga rehabilitation is beyond the scope of this EIS.

The national repository will be responsibly managed by the Commonwealth. As described in Section 3.2 of the Draft EIS, the Commonwealth's independent regulator, the Chief Executive Officer (CEO) of ARPANSA, will regulate the national repository. The ARPANS Act created the office of the CEO of ARPANSA, which has the responsibility for the licensing and subsequent regulation of the repository.

The CEO of ARPANSA regulates the nuclear and radiation activities of all Commonwealth departments, agencies and bodies corporate, including contractors to these organisations. The CEO of ARPANSA operates within an Act of Parliament and makes decisions in relation to licensing and regulatory matters based on the best available evidence.

The Government breached its own standards for disposal of long-lived waste at Maralinga (shallow burial of plutonium-contaminated debris); national and international standards may be breached again at Woomera.

The clean-up of wide scale, pre-existing contamination at Maralinga cannot be compared to a planned project to safely manage radioactive waste, such as the national repository project. The Maralinga Rehabilitation Project was an intervention, that is a clean-up of existing contamination.

The NHMRC 1992 Code does not formally apply to this clean-up; it is written for purpose-built facilities such as the national repository where provisions for radiation protection and safety can be made before an activity is started.

The conditions for the Maralinga clean-up took into account the lifestyle of the traditional owners and were consistent with IAEA requirements for interventions of this nature.

The NHMRC 1992 Code does allow for the disposal of a limited quantity of uranium, americium and plutonium in near-surface trenches. As it happens, the amounts of these substances buried at Maralinga fall well below the levels allowed by the NHMRC 1992 Code.

The national repository will be independently regulated by ARPANSA to ensure that it is managed according to the accepted relevant national and international standards.

The Premier of Western Australia is also strongly opposed to his State hosting a national radioactive waste repository. Over 50,000 people in Western Australia signed a petition several years ago to have legislation that would prohibit the importation of nuclear waste and both the major parties eagerly passed the **Nuclear Waste Storage (Prohibition) Act 1999.**

As described in Section 2.4.1 of the Draft EIS, Western Australia has an intractable waste disposal facility at Mount Walton East, 100 km northwest of Kalgoorlie. This accepts low level and short-lived intermediate level radioactive waste generated within the state, as well as toxic and chemical waste.

The Jackson area of Western Australia (Figure 1.3 of the Draft EIS) was one of the eight potential areas investigated during the site selection study, however it did not meet the criteria as well as the chosen area, the central–north region of South Australia (Table 5.2 of the Draft EIS).

2.5 Accepted International Practice

The burial of radioactive waste overseas has left a legacy of neglected and contaminated sites.

Nuclear waste burial in American and Europe has proven to be disastrous. The selection of suitable, safe and secure burial sites for this poison is illusory.

The rest of the world is phasing this technology out because of the obvious danger involved, so why does Australia seem to be doing the opposite?

We are concerned that clean-up costs of a leaking dump are estimated to be in excess of $1 billion. All similar sites in America leaked within 30 years.

There are over 100 near-surface repositories either in operation or in the process of being established in over 30 countries around the world. Section 2.5 of the Draft EIS describes a number of the facilities in detail, including their performance. Modern repositories are constructed, managed and licensed in such a way that they operate without adverse environmental impact.

The design of modern near-surface repositories is tailored to suit the environment in which they are sited. Near-surface disposal is an internationally accepted method for managing low level and short-lived intermediate level radioactive waste.

Facilities established in the past were not always established under strict environmental guidelines and licensing. This has resulted in some facilities, for example three repositories in the US, being closed because of a lack of environmental control.

Australia's national near-surface repository for low level waste will operate under conditions that will ensure the facility operates without adverse environmental impacts. The facility will be regulated and licensed by ARPANSA.

IAEA guidelines for the storage of radioactive waste note that proper support from the community is required before such proposals go ahead. Australia is a member of this agency and yet has failed both the local region and in the wider State.

This proposal for shallow burial does not have the support within the international community.

Accepted international practice for disposal of solid low level and short-lived intermediate level radioactive waste in near-surface repositories is outlined in IAEA guidelines (e.g. International Atomic Energy Agency 1981, 1984). Australian acceptable practice for the national radioactive waste repository is set out in the NHMRC 1992 Code.

The NHMRC 1992 Code states that public acceptability of the site and design of the facility should be evaluated by an appropriate public consultative process, and that all relevant submissions and proposals be considered. The proponent also needs to communicate and liaise with the general public and provide information to members of the public.

As discussed in Section 1.5, the consultation for the national repository for the EIS process and the previous three phases has been comprehensive (see Sections 1.5.3, 5.2 and 7.5 and Appendix G of the Draft EIS). Information on the repository has been widely distributed, and background on the project, including the Draft EIS, could also be viewed on the DEST website. More information on the release and availability of the Draft EIS is provided in Section 1.1.1.

The level of community consultation, and the cities and towns at which consultation was undertaken, was determined in consultation with Environment Australia. The obligations for community consultation have been fully met.

2.6 Reviews Relevant to the Proposal

An above-ground storage was formally recommended for use in Australia by the Senate Select Committee Report **No Time to Waste.**

The Government responded to the Committee's recommendation by stating that near-surface disposal, rather than storage, is more appropriate for low level and short-lived intermediate level waste, and that the Government would proceed with a study to identify a suitable location for siting such a disposal facility (see Section 2.6 of the Draft EIS).

The government should show transparency and have a full public inquiry. The decision for a public inquiry to be made by the Minister once a site is determined is considered to be inappropriate as it leaves the decision to the person charged with gaining approval for the project.

The environmental assessment of the proposal at the level of an EIS is comprehensive and involves public participation. The proponent must respond to issues raised by people commenting on the Draft EIS and publish the response in the form of a Supplement to the Draft EIS.

The most significant difference between assessment by EIS and by Inquiry is that the latter would involve a public hearing. It is not clear that this would add value to the process.

The Minister for the Environment and Heritage was fully aware of the range of assessment options in making his determination that an EIS was the appropriate means of evaluating the proposal in this case. Under the EPBC Act, the Minister for the Environment will consult with other Ministers before making a decision on the proposal.

Chapter 3

Regulatory Framework

3.1 International Organisations and Conventions

No comments were received on this topic.

3.2 Australia's Regulatory Framework

There will be no independent regulation of the national repository.

We are not confident that ARPANSA will subject the repository to the appropriate level of scrutiny.

ARPANSA has been disproportionately influenced by ANSTO who want the new reactor.

ARPANSA is too close to the ANSTO (the main waste producer) and too close to the Federal Government.

The national repository will be regulated by the Commonwealth's independent regulator, the CEO of ARPANSA (see Sections 1.6.2 and 3.2 of the Draft EIS, and Section 2.4 of this document). The ARPANS Act created, and sets out the roles and responsibilities of, the office of the CEO of ARPANSA, which has responsibility for the licensing and subsequent regulation of the repository.

The CEO of ARPANSA regulates the nuclear and radiation activities of all Commonwealth departments, agencies and bodies corporate, including contractors to these organisations. The CEO of ARPANSA makes decisions on licensing and regulatory matters based on the best available evidence. ARPANSA is independent of ANSTO.

ANSTO is Australia's biggest producer of radioactive waste (excluding uranium mines) and also has a formal role as adviser to the Government on radioactive waste issues. This is a conflict of interest.

The amounts of low level and short-lived intermediate level radioactive waste currently held in Australia, and those expected to arise in the future, are outlined in Sections 4.1 and 4.2 of the Draft EIS. ANSTO holds the second largest volume of existing waste to be disposed of in the national repository. In the foreseeable future ANSTO will produce about 30 m^3 of the routine annual arisings of 40 m^3.

The DEST is the prime source of policy advice for the Government on issues relating to radioactive waste management. In addition, certain other departments, including the Department of the Environment and Heritage, the Department of Industry, Tourism and Resources, and the Department of Foreign Affairs and Trade, have policy advising responsibilities in related areas.

As appropriate, the Government obtains specialist technical advice on nuclear issues, including advice relating to radioactive waste management, from agencies which include ANSTO and ARPANSA. The pool of technical nuclear expertise is small, and much of it is held within ANSTO, which the Government established in 1987 as Australia's national centre for nuclear expertise.

The Radiation Health Committee is yet to finalise dose limits for workers including emergency and transport workers.

The standards for radiation health protection (including for emergency and transport workers) are set out in the ARPANSA and National Occupational Health and Safety Council (NOHSC) guidelines *Recommendations for limiting exposure to ionizing radiation* and *national standard for limiting occupational exposure to ionizing radiation* (printed 1995; republished 2002). These guidelines follow the recommendations of the International Commission on Radiological Protection (1991).

ARPANSA's Radiation Health Committee is currently seeking public comment on a draft publication (*Draft recommendations for intervention in emergency situations involving radiation exposure*). However, the dose limits for workers and the public will remain the same as those recommended in the ARPANSA and NOHSC guidelines.

Democracy is compromised if the Federal Government can override the (SA) State Government's opposition to the repository.

The Australian democratic process is based on the Australian Constitution, which is an agreement involving all states and territories. In the Constitution certain powers are handed from the states to the Commonwealth. Section 109 of the Constitution, provides that, if a valid Commonwealth law is inconsistent with a law of a state parliament, the Commonwealth law operates and the state law is invalid to the extent of the inconsistency.

In the management of radioactive waste, the Commonwealth has the ARPANS Act in place, which provides for the establishment and regulation of national radioactive waste management facilities. It is not a question of the Commonwealth overriding state legislation as the Commonwealth already has the relevant legislation in place. Rather, the proposed State legislation is inconsistent with already existing Commonwealth legislation.

It should be noted that the proposal for a national repository for low level and short-lived intermediate level radioactive waste has been developed as a cooperative state/territory and Commonwealth project (see Section 1.6 of this Supplement). In the mid-1980s all state, territory and the Commonwealth governments agreed that a national repository was required for the disposal of Australian low level and short-lived intermediate level radioactive waste (see Section 5.2 of the Draft EIS).

Following this agreement, the NHMRC 1992 Code was developed and the current project to find a suitable site for the national repository began in 1992. The repository project is thus a long-established and agreed Commonwealth and state process.

The South Australian Government is trying to pass legislation to outlaw the repository, so why is the Federal Government proceeding?

As noted in the response to the previous comment, South Australia, along with all other states and territories, previously agreed to the establishment of a national repository. The Commonwealth process to locate the site for the repository is based on that agreement.

This process has identified the central–north region of SA as the best area to site the facility. The Commonwealth is seeking to establish the facility in this region, as it is important that the repository is sited safely and responsibly to ensure the protection of people and the environment.

The SA Nuclear Waste Storage Facility (Prohibition) (Referendum) Amendment Bill 2002 prohibits the transportation of low level waste into SA.

Existing Commonwealth legislation (the ARPANS Act) would have precedence over any state legislation, to the extent that they are inconsistent. As of 25 November 2002, the Nuclear Waste Storage Facility (Prohibition Amendment) Bill had not been passed by the South Australian Legislative Council.

Try dumping in America or perhaps Britain.

The policy of successive Australian governments is that countries should expect to make their own arrangements to safely dispose of their radioactive waste.

3.3 Approvals and Licences

Concerns were raised that the repository will be operated by a private contractor, and therefore may bypass ARPANSA requirements. Concerns have also been expressed about whether a private contractor would provide adequate security.

A private contactor may also put pressure on the Government to increase the level of radioactive waste to include long-lived intermediate level waste, and to take radioactive waste from overseas.

A company operating for profit will not have the long-term safety and viability of the environment as its major focus.

As noted in the previous section, the repository will be owned by the Commonwealth and regulated by the Commonwealth's regulator for radiation-related matters, ARPANSA, which has strict requirements on the use of radioactive materials in Australia, and which will impose very specific licence conditions and regulations that will need to be adhered to in operating the repository.

ARPANSA would not allow the disposal of radioactive waste in a near-surface environment if it were not appropriate to do so. ARPANSA would regularly audit the facility operation to ensure that all licence conditions were being complied with.

The Commonwealth has a separate project to site a national store for the management of its long-lived intermediate level waste. This facility, which will be subject to regulation by ARPANSA, will not be located on the same site as the national repository.

The contractual arrangements between the Commonwealth and any contractor engaged to operate the repository will define those security aspects to be provided by the contractor, and those to be provided by the Commonwealth.

What is the significance of an 'intention' for the disposal of radioactive ores from mining to be excluded from the facility? Will such an activity be specifically excluded from the licence?

As outlined in Section 1.1 of the Draft EIS, radioactive waste from the mining and processing of uranium ores and heavy mineral sands is disposed of in accordance with the national *Code of practice on the management of radioactive wastes from the mining and milling of radioactive ores* (Department of Home Affairs and Environment 1982) or as is otherwise provided for in the legislation of individual jurisdictions. This type of waste is usually generated in bulk quantities and is disposed of at or near the relevant mine or processing site. There is no need to dispose of this waste in the national repository.

The licence application to ARPANSA will indicate the nature of the waste to be disposed of in the national repository. The application will not include the waste from the mining and processing of uranium ores and heavy metal sands.

In light of the long life of a number of radionuclides and their daughters, what will the duration of the licence be for the facility?

The duration of the licence would be for the CEO of ARPANSA to determine (see Sections 1.6.2 and 3.2 of the Draft EIS, and Section 3.2 of this document).

As Site 52a is the preferred site and is located in the Kingoonya Soil Conservation Board District, the Soil Board should have a role in the ongoing monitoring of the site.

Under the ARPANS Act, ARPANSA has responsibility for the licensing and subsequent regulation of the repository.

Compulsory land acquisition would be an unforgivable disgrace and would engender shame and outrage.

As noted in the Draft EIS, the Commonwealth acquisition would be undertaken under the *Lands Acquisition Act 1989*, and would formally commence once the Minister for the Environment and Heritage has reached a decision on the repository proposal. The *Lands Acquisition Act 1989* allows land acquisition by agreement, or by compulsory process, following a well-defined series of steps. It is a standard process used for government projects.

Chapter 4

Radioactive Waste to be Held in the Repository

4.1 Inventory of Existing Waste

Table E7.1 of the Draft EIS indicates that long lived intermediate level waste (including uranium and plutonium) will be placed in the repository.

The Draft EIS appears to dismiss the important issue of the length of life of a number of radionuclides and their daughters, preferring to concentrate on the easier question of physical amounts of radioactive waste.

The half-lives of the radionuclides to be stored in the repository are typically 30 years, although some have a longer half-life. The NHMRC 1992 Code allows for the disposal of very low levels of radionuclides with longer half-lives in a near-surface repository.

South Australia already has 60% of the total 3700 m^3 of radioactive waste accumulated in Australia — most of which is contaminated soil stored at Woomera.

This volume percentage quantity is correct. As listed in Table 4.1 of the Draft EIS, the total inventory of low level and short-lived intermediate level waste currently held in Australia is 3700 m^3, of which 2228 m^3 (60%) is held in South Australia.

The waste inventory in the Draft EIS should be more thoroughly investigated across Australia, as is being done in South Australia.

The inventory could easily exceed the figures used for the risk calculations.

The Commonwealth sought input from the states and territories in determining the inventory. The waste inventory as presented in the Draft EIS is sufficient for the purposes of assessment of risks and for design of the national repository.

4.2 Future Waste Generation

The proposal fails to address the need for waste minimisation. The government should be supporting non-nuclear alternatives and actively reducing this amount of waste in Australia.

Transport and burial give the dangerously misleading impression that the waste has been eliminated, which encourages the production of more waste.

The Commonwealth Government agrees that alternatives to the creation of radioactive waste should be encouraged where feasible, and that there should be incentives for the minimisation of radioactive waste production. As described in Section 6.11 of the Draft EIS, disposal charges at the national repository would be set in such a way to encourage waste minimisation.

Much of Australia's existing inventory of waste is a result of the past use of radioactive materials in medicine, industry and research, and many of the items, such as exit signs containing tritium or watch or gauge dials painted with radium paint, are no longer generated (Section 4.1 of the Draft EIS).

Many of the radioactive sources used in medical and industrial equipment are now recycled, but some residual radioactive materials cannot be managed in this manner. About 40 m^3 of waste will be generated on average in future years (see Section 4.2 of the Draft EIS).

The level of waste generated in Australia is quite small when compared with the waste generated by countries with nuclear power programs. For example, France generates about 20,000 m^3 of low level and short-lived intermediate level waste per year, compared to the 40 m^3 of waste generated per year in Australia (see Section 4.2 of the Draft EIS).

The Commonwealth Government is committed to promoting the use of renewable energy sources and technology, and has developed a range of strategies, measures and incentives to encourage development of renewable energy sources.

We are conscious that the majority of the waste will come from the decommissioning of the Lucas Heights reactor and believe that it is inappropriate to transfer the problem to the Woomera area.

In order to avoid the hazards of transporting waste an above-surface repository should be built near Lucas Heights.

ANSTO is responsible for 80–90% of the waste volume the Government wants to dump in SA. The reactors alone could compromise a waste volume greater than the entire existing national inventory accumulated over the past 40–50 years.

The real reason for repository is to make way for the waste that will be generated by the proposed new nuclear reactor in Sydney.

The source of the majority of the waste is Sydney.

Finding storage for expected contamination from the new nuclear reactor is behind the push for a national repository.

The dump site proposal is based on half-truths that are designed to allow ANSTO to rid itself of radioactive waste so it can create even more.

Very little waste will come from medical and industrial sources around the country.

Only 4% of the proposed waste will come from medical and industrial uses of radioactive materials and the rest will come from the nuclear reactor at Lucas Heights.

The 100 or so storage points around Australia continue to be the presenting reason for the establishment of a national dump. However DEST's other documentation reveals that the material from Lucas Heights is expected to be a least 75% of the total radioactivity level of any material proposed for the site. Thus the marketing of this scheme in the last few years is not being transparent with the public. The Draft EIS taking the same stance is flawed.

It can be demonstrated that this repository is not intended to address management of state owned wastes, but to provide the Commonwealth with an out of sight dump that will facilitate radioactive wastes being produced by the existing and proposed nuclear reactor in Sydney.

Medical, industrial and scientific use of radioactive materials is a smoke screen (like the scientific use of uranium).

Since the early years of the twentieth century, Australia has accumulated around 3700 m^3 of low level and short-lived intermediate level radioactive waste from a wide range of medical, industrial and research activities (see Table 4.1 of the Draft EIS). The waste is owned by all Australian governments and a number of other entities, and is stored at over 100 sites around Australia.

More than half of the waste belongs to CSIRO and is stored in the Woomera region. At present, low level and short-lived intermediate level waste is generated at a rate of about 40 m^3 per annum (Section 4.2 of the Draft EIS), of which ANSTO generates about 30 m^3 per annum.

Over a 50 year period, the minimum operating life for the repository, it is expected that some 2000 m^3 of waste would be generated from routine annual arisings.

There are three options for HIFAR decommissioning, as described in Section 4.2 of the Draft EIS. These options would result in the generation of 2500, 500 or 2000 m^3 of low and short-lived intermediate level waste respectively. Decommissioning waste would, at most, be about 30% of the total volume of waste to be managed in the repository.

Along with the rest of Australia, the suitability of the region near Lucas Heights for a repository was considered during the national repository site-selection process. The process showed that that region is unsuitable for the national repository because it does not satisfy a number of the site selection criteria outlined in Section 5.1 of the Draft EIS. The site selection process (described in Section 5.2 of the Draft EIS) also showed that the region that includes Woomera is the most suitable in Australia for the siting of the repository.

In July 2001 the Government said the Lucas Heights reactor would generate 500 m^3 of waste for the Woomera dump. Now we are told that the volume could be 5 times that amount. Are there more surprises to come?

The three options for the decommissioning of the HIFAR research reactor would result in the generation of 2500, 500 or 2000 m^3 of low and short-lived intermediate level waste respectively (Section 4.2 of the Draft EIS). At this stage, the Government has not determined the decommissioning option that is to be used.

The inventory provided is the best estimate of existing and future waste arisings.

It is stated that currently no nuclear reactors in Australia generate high level waste, but what of the future? If high level waste is generated, what happens to the waste then?

High level waste is generated by nuclear power reactors. There are no plans to establish such facilities in Australia.

High level waste is not suitable for disposal in a near-surface facility such as the national repository. Overseas, such waste is stored pending disposal in geological repositories.

4.3 Waste Acceptance Criteria

The waste acceptance criteria have still not been established.

The Draft EIS states 'waste acceptance criteria would be developed for the facility before operations begin'. There is no specification as to what these criteria would include and similar comments appear throughout the document.

Waste acceptance criteria will be finalised during the detailed design stage, as part of the ARPANSA licensing process (see Section 3.3 of the Draft EIS). Considerable information on the proposed content of the criteria is provided in Section 4.3 of the Draft EIS.

By volume, half of the existing waste is the contaminated soil currently stored near Woomera that is in a stable condition and constitutes less than 1% of the existing waste inventory by radioactivity. A comparison of volume versus radioactivity percentage should be analysed and be part of the EIS so that the public can make informed judgements on radioactivity and its associated risks, in this proposal.

The contaminated soil currently stored at Woomera is of low activity, as is noted in the Draft EIS (see Section 4.1) but the present location, relative activity and volume of this waste were not of relevance to the repository site selection exercise. The site selection process considered 13 factors such as geology, climate and groundwater (see Sections 5.1 and 5.2 of the Draft EIS).

The activity of particular waste from any location is addressed as part of the waste acceptance criteria (Section 4.3 of the Draft EIS). As described in the Draft EIS, the waste acceptance criteria will take account of radionuclide activity factors, as well as the nature of the waste. Radioactivity limits would be applied, and waste packaging would be used appropriate to the activity and nature of any particular waste consignment.

Submissions have sought confirmation that the repository will:

- ***accept unwanted sealed sources of ^{60}Co and ^{90}Sr and ^{137}Cs from medical institutions***
- ***not accept unwanted sealed sources of ^{226}Ra from medical institutions***
- ***not accept any long-lived intermediate wastes (i.e. with a half-life of more than 30 years) from the decommissioning of the ANSTO reactor or cyclotron.***

Quantitative acceptance criteria for the proposed national repository will be derived from a comprehensive safety assessment of the detailed design of the repository. Activity concentration limits will be generated for all significant radionuclides including ^{60}Co, ^{90}Sr, ^{137}Cs, and ^{226}Ra. These limits would apply to all types of conditioned waste suitable for near surface disposal.

Given the shorter half-lives for ^{60}Co, ^{90}Sr and ^{137}Cs, it is likely that sealed sources containing these radionuclides, properly conditioned for disposal, would be acceptable for the proposed national repository. In general, the activities of used ^{226}Ra sources currently in storage would exceed generic concentration limits, as presented in the NHMRC 1992 Code and would not be acceptable for near-surface disposal.

Only very low levels of alpha-emitting radioactive waste are acceptable for near surface disposal, and it is likely that intermediate level waste containing long lived radionuclides arising from decommissioning of nuclear installations would exceed the quantitative acceptance criteria for the repository.

Chapter 5

Repository Design and Site Selection Criteria

5.1 Site Selection Criteria

The criteria as outlined by the NHMRC do not include assessments of the nation's socio-political landscape of the next 300 years, which is the minimum required time frame for this site — assuming that the site is only used for low level waste over the next 50 years.

The socio-political landscape is the most important criterion. It is far more important than any of the criteria outlined by the NHMRC. The most obvious reason for this is that if Australia ceases to exist as a nation-state there is no likelihood of the site being maintained or monitored. Similarly if Australia was to become impoverished, diseased, totalitarian, fundamentalist or invaded the site is very unlikely to be maintained or monitored. It is of course impossible to predict such outcomes accurately but given that all the other criteria are essentially speculative, this socio-political criterion should be included.

Discussion on the scope or content of the NHMRC 1992 Code is beyond the scope of the EIS.

The criteria as outlined by the NHMRC do not include assessments of the economic impact of the site. The placement of the site in South Australia is likely to have immediate economic ramifications including the erosion of the clean, green image which is already important to the State's economy and is likely to become much more important in the near future. A radioactive waste dump would tarnish South Australia's clean green image and impact on key industries of agriculture, food, wine and tourism.

The criteria in the NHMRC 1992 Code for site selection for the proposed national repository included consideration of the social and economic impacts and the specific requirement to avoid areas that are of environmental or cultural significance (see Section 5.1.1 of the Draft EIS). The preferred site chosen for the proposed national repository meets these criteria. The relevant criteria include:

- Criterion (h) — the facility should be located in a region that has no known significant resources, including potentially valuable mineral deposits, and little or no potential for agriculture or outdoor recreational use.
- Criterion (j) — 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.
- Criterion (k) — the site should not be located in an area of special cultural or historical significance.

It is unlikely that a radioactive waste disposal facility that is shown to be well designed, safe and to have a minimal long-term environmental impact would be seen as affecting the environmental or economic image for the State. A radioactive waste facility in the Champagne area of France, for example, has not detracted from the image of that area.

5.2 The Site Selection Process for the National Repository

From the outset you had made up your minds up on the approximate location.

The proposed site was supposedly selected 'following an extensive site selection process', however shortage of Government funds stopped that.

These statements are not correct; there has been an extensive three-phase consultative process to determine an appropriate site for the repository over some 10 years before the release of the Draft EIS, as described in Sections 1.5 and 5.2 of the Draft EIS. Each of these phases was accompanied by a public discussion paper and followed up with a further report responding to public comment. Extensive field work and investigations were undertaken during this process.

The use of outback South Australia constitutes an 'out of sight, out of mind' mentality.

There are suitable sites in other states to cater for their own radioactive waste.

The site selection half way across the continent is beyond logic.

The proposed siting of the national repository does not reflect an 'out of sight, out of mind' mentality. The selection of central–north South Australia for the siting of the national repository is the result of applying 13 internationally based technical selection criteria adapted for Australia's circumstances (see Section 5.2 of the Draft EIS).

The preferred site and alternatives were selected as a result of applying these selection criteria in a nationwide search. All states and territories were considered. The sites chosen provide a safe environment in accordance with accepted international practice for the disposal of Australian low level and short-lived intermediate level waste.

The national repository will be well managed, regulated and under surveillance during periods between disposal campaigns and during the institutional control period of 200 years following the closure of the facility. The regulatory and licensing arrangements are described in Sections 3.2 and 3.3 of the Draft EIS.

As the generation of ongoing waste is relatively small, it would be more appropriate to establish the facility near a large centre from where scientific expertise and security workers are readily available.

As noted above, the site selection process for the siting of the national repository is the result of applying 13 internationally based technical selection criteria adapted for Australia's circumstances, as set out in the NHMRC 1992 Code (see Section 5.2 of the Draft EIS). The suggested approach would not be in accordance with the established criteria.

Both political parties in South Australia and 80% of the state oppose the repository.

It is clear that the vast majority of South Australians do not want their State to become the dumping ground for the nation's radioactive waste.

The rights of SA and the rural communities along the proposed transport routes are more important than the expansion of the nuclear industry in Australia.

The present South Australian Government's position does not agree with the position of previous South Australian governments, which agreed to and participated in the national approach to establishing a national repository in 1992.

The South Australian Government's position does not take into account the benefits that South Australians receive from the use of radioactive materials in medicine, industry and

research, and the benefits that would result from use of an approved site for the disposal of the radioactive waste currently stored in some 26 locations in the State, and from the appropriate disposal of radioactive waste likely to arise in the State in the future.

Existing Commonwealth legislation, the ARPANS Act, will have precedence over any State legislation to the extent that they are inconsistent.

As noted in Section 1.6, it has been reported that the South Australian Minister for Environment has stated that, while the South Australian Government's policy was to reject a national repository in South Australia, it would be 'practical' to use it if it went ahead (*The Advertiser*, 13 November 2002).

The statement that both South Australian parties oppose the repository is incorrect, as the South Australian Opposition supports the previously agreed approach to establishing a national repository.

The statement that 80% of the people of South Australia oppose the repository presumably refers to an opinion poll taken by *The Advertiser* newspaper, published on 31 July 2000. As noted in Section 1.3.3, the survey was taken without informing people about the options and reasons for having a national repository, the current arrangements for storing waste, and the reasons why the central-north region of South Australia was chosen.

Page 15–16 of Draft EIS Summary states: 'The Eromanga Basin is the largest and most central of the three depressions that together make up the Great Artesian Basin'; the Phase 2 report states that the Great Artesian and Murray-Darling Basins were excluded from the search because of their extensive and widely used groundwater resources and intensive agricultural industries — then how was Site 52a even contemplated?

Site 52a is not within the Great Artesian Basin. As stated in the Summary, sediments below Site 52a are outliers of the Eromanga Basin, i.e. the sediments do not lie within the basin itself. The alternative sites (40a and 45a) are also not within the Great Artesian Basin. This is shown in Figure 8.1 of the Draft EIS.

Why was the central–north region of South Australia chosen when the Olary region was found to be equally suitable?

The central–north region of South Australia was selected over the Olary region for siting studies as it had the largest area of suitability against the selection criteria, as described in Section 5.2 of the Draft EIS. In addition, the Olary region in part overlaps both the Murray-Darling and the Great Artesian Basins, which are important water resources.

We have no concerns with the use of Site 40a or 45a, which occur outside the WPA (but within the general Woomera area) and urge that either of these sites be selected instead of Site 52a.

We strenuously urge that the repository be located no closer to the Woomera Instrumented Range than Sites 40a or 45a.

Some radioactive waste is already stored at two sites relatively close to Site 52a. Siting the repository outside the WPA, for example at Sites 40a or 45a or at greater distance, would provide an opportunity to rectify this hazardous situation.

If a single repository is to be opened, its location should preferably be as proposed due to the optimal geology and the location of most of the waste at present.

We are satisfied that there has been an exhaustive selection process to identify the central–north region of South Australia as the most appropriate location, on geological grounds, for the repository. We believe that the repository should be established at the preferred site — Site 52a.

Section 14.12 of the Draft EIS indicates that Site 52a is the preferred site on the basis of assessment of all relevant factors. Site 52a is superior to Sites 40a and 45a in terms of access, security, biology and hydrology, however both 40a and 45a are acceptable alternative sites.

While the main disadvantage of Site 52a compared to the other two sites is its potential impact on the activities within the WPA, the environmental impact and risk assessment indicates that there is a low risk of any such impacts, and the risks can be managed by good practice.

For jurisdictional reasons, the repository should be established at the preferred Site 52a because the Commonwealth has jurisdiction over the Woomera Prohibited Area within which the preferred site is located.

The repository should be established on the preferred site, 52a, to reduce the possibility of any dislocation to existing business at Olympic Dam by protestor action. The location of the repository at Site 45a would make it more likely that protestors would continue to target Olympic Dam.

The control the Commonwealth has over the WPA has been taken into account in the siting studies. Apart from the geology and groundwater characteristics, which are superior at Site 52a when compared to the other two sites, the security provided by the WPA provides an advantage at Site 52a.

5.3 Repository Design Criteria

The dump will only have an 'institutional control period' of 100 years. This means the dump's operator is only responsible under law for 100 years.

There is concern that the period of 'institutional control' of the repository will not last as long as the life of the hazardous waste.

Once the facility has ceased operations there will be a period of institutional control for 200 years. The site will continue to be monitored to check the integrity of the disposal facility and to carry out a program of environmental monitoring. Access to the site will remain restricted during this time. The various surveillance programs are outlined in Chapter 13 of the Draft EIS.

A 200-year institutional control period would be more than adequate to allow the radioactive materials to decay to such a level that the site could safely return to other uses.

After 200 years, about 1% of the original activity would remain of the quantity of radionuclide with a 30-year half-life (the typical half-life of low level waste) (see Section 2.1).

The dump will only have an 'engineering integrity' of 300 years. Some wastes have half-lives extending far beyond the institutional control period.

The half-lives of the radionuclides to be stored in the repository are typically 30 years, although for some radionuclides the half-life is longer. The NHMRC 1992 Code allows for the disposal of very low levels of radionuclides with longer half-lives in a near-surface repository.

At the end of the 200-year institutional control period the radioactivity in the disposed waste would have decayed to such a level that the site could safely return to other uses. Long-lived radionuclides would be buried at an acceptably low level of activity concentration to ensure this requirement.

All buildings, structures and infrastructure would be designed in accordance with Australian Standards, including provisions for stability under seismic conditions.

The proposed 'dilution approach' to placing long-lived intermediate level waste in the repository implies that a larger area will be required for deposition. This raises questions over the potential environmental safeguards at the site with spreading of radioactivity over large distances. The Draft EIS does not make clear how the dilution-spread approach will work at the design level and what environmental safeguards will be involved.

The total activity limits for radionuclides will be established for the repository from the safety assessment. This will include very small quantities of long-lived intermediate level waste to be disposed of in the facility. Such materials will have to meet the acceptance criteria such as the conditioning of the waste and their activity concentration limits derived from a detailed safety assessment of the final repository.

The description of the proposed repository design and operation in the Draft EIS does not support the 'dilution approach' for long-lived intermediate level waste, nor the contention that waste will be deposited over a larger area than indicated. As noted in Section 6.1.5 and Figures 6.1 and 6.2 of the Draft EIS, only the central 100 x 100 m area of the 1.5 x 1.5 km total repository site would be used for waste disposal.

The programs for environmental management of the site both during operations and post-closure are described in Chapter 13 of the Draft EIS. These programs will ensure that the environmental impacts are minimised and will provide a long-term environmental safeguard for the site.

The proposed solution to waste management must take into account the length of life required with respect to a repository, and the issue of proper management.

With respect to the life of the facility, what is the length of life specified in the proposal with respect to engineering design of the facility?

The NHMRC 1992 Code sets out the design and management requirements applicable to the national repository. The national repository will be regulated by the Commonwealth's independent regulator, the CEO of ARPANSA (see Sections 1.6.2 and 3.2 of the Draft EIS, and Section 3.2 of this document).

The NHMRC 1992 Code specifies the required design life and structural life for engineered barriers to be incorporated in the design of the facility. The NHMRC 1992 Code calls for the design life of engineered barriers for the disposal of Category B and C waste to be not less than 300 years with a structural life of 1000 years. The disposal structures will be designed accordingly.

Ultimately there is no permanent or proven solution for radioactive waste.

The Draft EIS does not justify the preference for an underground dump as opposed to an above-ground storage facility. The proposed strategy of management should be reconsidered.

The design criteria for a near-surface repository for the disposal of low level and short-lived intermediate level radioactive waste are described in Section 5.3 of the Draft EIS.

The NHMRC 1992 Code sets out the design and management requirements applicable to the national repository. The national repository will be regulated by the Commonwealth's independent regulator, the CEO of ARPANSA (see Sections 1.6.2 and 3.2 of the Draft EIS, and Section 3.2 of this document).

The proper application of the NHMRC 1992 Code will ensure the safe disposal of Australia's low level and short-lived intermediate level radioactive waste.

I am concerned about shallow burial.

Burial is a cumbersome and inefficient way to manage radioactive materials.

Shallow burial of radioactive waste is a 'cheap' solution to radioactive waste management. There are other options and there are serious doubts about the long-term consequences of shallow burial.

Radioactive waste disposal by burial is widely agreed to be an unsatisfactory approach due to difficulties in detecting and repairing any leaks from the contaminated site.

I hope that money can be allocated to researching a better way.

Any existing technology is by definition experimental.

To proceed with a national radioactive waste repository would constitute an act of gross negligence on the part of the Federal Government.

I think it is ludicrous to put the health and well-being of all Australians (including our native flora and fauna), at risk because of such a short sighted and selfish approach.

I believe this method is not considered to be world's best practice, therefore I cannot understand why it is even being contemplated let alone recommended.

Near-surface disposal of solid low level and short-lived intermediate level radioactive waste is accepted international practice, as outlined in IAEA Guidelines (see Section 2.5.1 of the Draft EIS). A near surface facility provides the required isolation for this type of waste to decay to acceptable levels, within a period of time for which institutional control of the repository can reasonably be expected to continue.

The NHMRC 1992 Code sets out the design and management requirements applicable to the national repository. The national repository will be regulated by the Commonwealth's independent regulator, the CEO of ARPANSA (see Sections 1.6.2 and 3.2 of the Draft EIS, and Section 3.2 of this document).

Near-surface disposal structures are tailored to suit the environment in which they are situated. There are over 100 near-surface repositories either in operation or in the process of being established in over 30 countries around the world.

The monitoring program for an individual facility is determined from an assessment of the potential environmental aspects of the facility based on the facility design and the environment in which it is situated (see Chapter 13 of the Draft EIS).

As described in Section 1.6.2 of the Draft EIS, the current temporary and mostly ad hoc arrangements for the storage of low level radioactive waste in Australia are unsustainable and inconsistent with the EPBC Act and the principles of ESD (see also Section 1.3.1 of this document). Greater risks are associated with multiple storage locations, and non-purpose designed facilities.

Chapter 6

Description of Repository Facility

6.1 Facility Objectives and Design Basis

A covered pit or trench, no matter how well constructed and sealed with have a limited and finite volume. Additional excavations will be needed to accommodate future production of radioactive waste. Construction of the repository should be carried out to enable the expansion of the storage area without the future need to allocate additional land space.

As noted in Section 6.1.5 and Figure 6.2 of the Draft EIS, only the central 100 x 100 m area of the 1.5 x 1.5 km total repository site would be used for waste disposal.

The Draft EIS ignores the production of short-lived intermediate waste, which has a half-life of 30 years, which then amounts to 300 years, but it is proposed in the Draft EIS that the waste will be left alone for 50 years. This is an inadequate analysis.

There is neither discussion nor plans outlined for what to do with the waste after the 50 years of the planned use of the repository. This proposal is only a short-term solution for 50 years and therefore is clearly inadequate in terms of ESD.

The operational life of the proposed national repository is expected to be at least 50 years during which time there will be occasional disposal operations. During the extended periods when there are no disposal operations, an active program of environmental monitoring and surveillance will be maintained to ensure the safety of the repository and security of the site. After 50 years of operation, there would be a review to consider whether the repository should continue to accept waste.

Once the facility has ceased operations there will be a further period of institutional control for 200 years. The site will continue to be monitored to check the integrity of the disposal facility and to carry out a program of environmental monitoring. Access to the site will remain restricted during this time. The various surveillance programs are outlined in Chapter 13 of the Draft EIS.

The purpose of the institutional control period is to maintain the safety of the repository for the time required for the activity of short-lived radioactive species in the waste to have decayed to such a level as to safely allow unrestricted land use at the site.

The existing sites where the current nuclear waste is stored will continue to be needed under this proposal with the disposal campaigns occurring every 2–5 years. These existing sites need to be upgraded and brought up to a standard with procedures in place to ensure safe storage and handling and keeping our environment pristine. This would then reduce the need for a nuclear dump.

Much of the waste that is currently stored is the result of past use of radioactive materials — it is no longer generated. Only 40 m^3 of low level and short-lived intermediate level waste is routinely generated in Australia each year. This waste should ultimately be disposed of appropriately, hence this proposal for establishing a national radioactive waste facility.

Removing the historical arisings of waste will mean that the current stores, which are not designed for the long-term management of waste, are no longer full. The stores currently containing waste that is no longer generated, will not be needed in the future.

The plan for the repository seeks to minimise the dangers attendant on transportation of materials by suggesting that they will only be collected for transport to the repository every two years or so.

This is not correct. Disposal campaigns would be intermittent (expected every 2–5 years) because of the small quantities of low level and short-lived intermediate level radioactive waste generated in Australia annually (about 40 m^3 per year). These small quantities do not justify more frequent disposal campaigns.

6.2 Disposal Facility Design

I have concern that there is not even a lining proposed for the walls of the repository.

It is a concern that the repository will be unlined, especially if it is to be built in 2 months, this gives the perception that is will be a hole in the ground with a few simple sheds nearby for administration. We are suspicious about the 'cover'. The Draft EIS states 'A suitable cover would be placed over the buried waste to limit infiltration of rainwater, discourage entry of animals and humans and inhibit erosion.' Why not say 'prevent' or aren't the authors of the Draft EIS confident.

The proposed design will not prevent leakage of water, nor human, animal or plant intrusion.

The design philosophy adopted by the proponent creates the potential for environmental harm to occur as a result of leachate migration to the watertable as defined by the SA* Environment Protection Act 1993. *The facility is 'designed to leach' rather than each storage cell being totally sealed.

The facility is not 'designed to leach'. A range of alternative design options were considered for the repository and included a cover profiled and constructed to limit water infiltration, as outlined in Section 6.2.5 of the Draft EIS. A range of possible cover designs (eight in all) was assessed (see Table 8.14 of the Draft EIS).

The cover will limit infiltration of rainwater, discourage entry of animals and humans and inhibit erosion, as stated in the Draft EIS. Lining of the walls is unnecessary, as the cover would extend beyond the walls.

Detailed modelling of the potential for infiltration of water and generation of leachate used engineering parameters determined from laboratory tests on actual soil samples from the preferred and alternative sites, as described in Appendices C4 and C5 of the Draft EIS, and summarised in Sections 8.5.6 and 8.10.3.

The depth of the watertable beneath each site provides further protection. The results of the modelling indicate concentrations at the base of the repository of the selected radionuclides modelled to be so low as to be effectively undetectable (see Table C5.4 of the Draft EIS for the detailed figures).

The Draft EIS does not address extreme rainfall events and in particular sheet water flow for 1000 years average recurrence interval (ARI) or the probable maximum precipitation (PMP). In addition, the extent of flood out from local watercourses for a 1000-year ARI flow event has not been checked.

The design would ensure that surface water from rainfall events does not accumulate in the vicinity of the buried wastes, or enter trenches or boreholes, both during operations and after closure (Section 6.2.2 of the Draft EIS).

Surface drains from operational areas where radioactivity is handled would lead to an evaporation pond within the repository compound to collect runoff and contain potentially

contaminated surface water on site. During operations, while trenches or boreholes were open, facilities would be available to collect any rainwater that accumulates in the bottom of a trench.

The preferred and alternative sites were chosen in part on the basis of their topography; none has significant drainage features and all are located where site drainage is favourable (see Section 8.4 and Figure 8.2 of the Draft EIS). All three sites are located away from local watercourses.

Storm frequency event data were estimated for Woomera using Institution of Engineers Australia methodology (Section 8.6.1 of the Draft EIS). The data for a 1-in-100 year storm event frequency are presented in Table 8.12.

The suggestion of a 1-in-1000 year ARI rainfall event or PMP as a basis for design of the national repository is regarded as unduly conservative. For the Olympic Dam Expansion, previously approved by the South Australian and Commonwealth governments in an EIS process, the tailings storage facility can cater for a 1-in-500 year rainfall event without overtopping, and other parts of the plant are designed to 1-in-100 year events (Kinhill Engineers Pty Ltd 1997a, 1997b). In comparison with the large open areas of the Olympic Dam tailings storage facilities, the trench and boreholes of the repository would be open for very short periods, and all materials would be contained in drums or packages (mostly 205 L drums).

Stormwater management would be further addressed at the detailed design stage, as part of the ARPANSA licensing process.

6.3 Site Support Facilities

***The proponent has not supplied details of any chemicals to be stored on site nor outlined measures to minimise the risk of spills or accidents and whether storage would conform to relevant guidelines such as SA EPA* Guidelines for bunding and spill management.**

It is not expected that many chemicals would be stored on site; minor quantities of cement, sand and aggregate would be available should any further conditioning of the received waste be required.

As noted in Section 6.3.6 of the Draft EIS, temporary generators would be provided for site power generation, and would be located within the services compound. Fuel for the generators would be stored in drums or above-ground tanks in a bunded area within the services compound. The bunding would be designed and constructed in accordance with AS 1940-1993, as referenced in the SA EPA *Guidelines for bunding and spill management* (July 2002).

6.4 Description of Construction Works

No comments were received on this topic.

6.5 Description of Operations at the Repository

The Commonwealth has failed to adequately prescribe the design of a facility that could result in detrimental environmental outcomes.

There are no detailed plans of how the repository would operate; therefore it is not possible to make an informed decision.

There is nothing more than an 'indicative design' for the dump.

An outline of the likely design and operational plans for the repository is given in Chapter 6 of the Draft EIS. Greater details of design and operations will be presented in the application to ARPANSA for a licence to operate the facility, expected to be in 2003 subject to the satisfactory completion of the environmental assessment process.

Insufficient detail has been provided on the collection and consolidation part of the logistics chain within the metropolitan area. There is a concern regarding the numerous locations where storage takes place and how and where vehicles will be 'consolidating' their loads of low level waste.

An overview of the planning and preparation for collection is provided in Section 6.5.4 of the Draft EIS. The final arrangements would be determined in consultation with ARPANSA as part of the licensing process (Section 3.3 of the Draft EIS).

6.6 Security, Health, Safety and Environment

There is no guarantee of safety.

Beware of safety compromises motivated by cost-cutting.

Construction, maintenance etc. need to be government controlled and supervised.

The repository will be owned by the Commonwealth and regulated by the Commonwealth's regulator for radiation-related matters, ARPANSA, which has strict requirements on the use of radioactive materials in Australia, and which will impose very specific licence conditions and regulations that will need to be adhered to in operating the repository.

The repository will be operated in accordance with NHMRC 1992 Code and the ARPANSA 2001 Code. These codes are consistent with the most recent international standards and practice. Safety will not be compromised by cost-cutting.

There are doubts about the ability of a private contractor to provide the necessary level of security.

The claim that security will be adequate based upon occasional inspections and a fence belies the fact that such approaches in the outback have previously failed including difficulties with the rabbit proof fence.

In light of the potential concern over loss of material from radioactive waste repositories, the potential for direct damage to the repository and liberation of radioactive material, and the potential for threats to the community from illicitly gained radioactive material, what are the assurances with respect to longer term security of the site? Is site security possible for the time periods required for radioactive decay to occur?

The proposed transport routes through NSW and the rest of Australia for radioactive material do not indicate the levels of security involved.

The transport presents opportunities for terrorist activities.

If the preferred site is not ultimately selected for the repository, more security and surveillance must be provided than is proposed in the Draft EIS. Based on their experience, the proposed security arrangements are not believed to be adequate if the repository is located on property not controlled by the Commonwealth.

There must be a permanent presence of security personnel at the repository to both safeguard the repository and to detect any possibility of vandalism of property in the vicinity. Additional arrangements would be necessary if Site 45a were used for the repository.

The Draft EIS underestimates the effort and logistics required in protestor management, as well as potential safety, monetary and vandalism impacts of protestors throughout the region.

It is felt that a permanent security and intelligence presence is required for at least the first year of operation of the repository.

Security fencing will not stop a terrorist or dedicated naïve demonstrator. Being located in the Woomera Prohibited Area is essential, but not sufficient.

There is potential for terrorist targeting, as recent discoveries of 'dirty bombs' in USA show terrorist interest in nuclear waste.

It is not safe to store waste centrally, for this provides a target for sabotage or terrorist attack.

Our company has spent $2.4 million enhancing security around its pump stations due to protestors and it has not been able to fully safeguard its property against the actions of protestors to secure prompt action through the courts to deal with a situation of continuing trespass and vandalism. The company is concerned that it could be faced with a similar situation if Site 45a were to be selected whereas some of these difficulties are avoided by Commonwealth jurisdiction over the preferred Site 52a.

While the Commonwealth is proposing to acquire land on which the repository is to be established, Site 45a would remain surrounded by pastoral lease operations on which assets would be at risk when protestors seek access to the repository.

Part of the licence application to ARPANSA will involve a threat assessment for the relevant site to be undertaken by the Australian Security Intelligence Organisation (ASIO), together with an outline of the proposed security system for the various stages of the facility operation. This is expected to involve a combination of physical security, surveillance and an on-site presence as appropriate. ARPANSA would need to be assured that the proposed arrangements provided adequate security for the radioactive waste at the repository site.

If Site 52a were chosen, the siting on the WPA would provide additional protection to site security.

The burial of the low level and short-lived intermediate level waste at depths of at least 5 m would provide a high level of protection for the material from people and the natural environment.

The Draft EIS does not compare security issues in regards to centralisation versus storage at existing facilities.

The repository design and operation is based upon the NHMRC 1992 Code. The Code does not envisage continued storage of low level and short-lived intermediate radioactive waste at existing facilities as a suitable long-term approach to the management of these wastes.

Once placed in the repository, the wastes would have a cover of at least 5 m. Accessing any material in the repository would be a significant logistical exercise involving the use of large earthmoving equipment. Any radioactive sources determined to be of higher activity would be contained within a conditioned concrete matrix in the repository. The Commonwealth's view is that the long-term security of these materials in the repository would be far better than at the more than 100 current sites around Australia.

Preference for Site 52a appears to hinge in large part on the perceived better security of the site. However, the single continuously manned security checkpoint for the entire WPA/WIR is located 45 km away and personnel can readily gain access to the WIR via station tracks from the Stuart Highway and Roxby Downs Road.

We believe that the security advantages of siting the repository in the WPA have been overstated. It is understood that there is just one continuously staffed checkpoint and that alternative routes into the WPA are generally unhindered. Any security advantages that exist are a consequence of trials activities — the very same activities that are threatened by the presence of the repository.

Site 52a has been selected as the preferred site because it performed better against the selection criteria than the other sites (Section 1.5 of the Draft EIS). It is superior to the other sites in terms of surface land form, geology, infrastructure and access, and control and security.

The WPA is a region where the Commonwealth has some control, and as such it is preferable to site the repository in this region as opposed to elsewhere near Woomera.

There are no differences between the three proposed sites in terms of security; all three sites require additional independent security provisions to prevent entry by determined groups such as protestors or terrorists.

The Draft EIS overstates the security advantages of siting the repository within the WPA due to the threat that the repository would pose to ongoing WIR activity.

The WPA provides additional benefits in terms of security and Commonwealth control, compared with the alternative sites outside the WPA. Part of the licence application to ARPANSA will involve a threat assessment for the relevant site, and an indication of how an appropriate level of security would be provided.

The repository should be established on the preferred Site 52a to reduce the possibility of any dislocation to existing business at Olympic Dam by protestor action. Location of the repository at 45a would make it more likely that protestors would continue to target Olympic Dam.

It is agreed that the preferred site (Site 52a) performs best in the assessment of the comparison of the preferred and alternative sites (Section 14.12 and Table 14.1 of the Draft EIS). The security provided by the WPA is one element of that assessment.

6.7 Receipt, Recording and Retrieval of Disposed Wastes

We are concerned that using pneumatic drills for retrieval of buried material is clumsy and potentially dangerous to workers.

As noted in the Draft EIS an added risk of burial is digging up previously buried waste.

An operating procedure would be developed for retrieval operations. This procedure, which would be submitted to ARPANSA for approval, would use practical methods to ensure that a

minimum of disruption was caused to the cap and the buried waste, and would include appropriate safety procedures.

6.8 Description of Surveillance Period

No comments were received on this topic.

6.9 Description of Institutional Control, Decommissioning and Closure

No comments were received on this topic.

6.10 Ownership and Operation

I am in support of the repository, however I have considerable reservation that a private contractor will operate the repository. The concern is that a private contractor would not resist the commercial temptations to put pressure on the government of the day and possibly bypassing ARPANSA to increase the level of radioactive waste to long-lived intermediate level waste or take waste from overseas.

I am concerned that private contractors would undertake operations. The Draft EIS states that 'providing that suitable management actions are undertaken, key threatening processes would not increase as a result of the construction and operation of the waste repository'. Private contractors tend to put profit ahead of the protection of the natural environment.

A private contractor engaged to operate the repository would be oversighted by the relevant Commonwealth department and regulated by ARPANSA, which would regularly audit the facility operations to ensure compliance with the licence provisions. Unless the facility has a valid operating licence, and is operated under conditions set in the licence, it will not be allowed to continue to operate.

The national store will house long-lived intermediate level waste produced by Commonwealth agencies.

Radioactive waste is a prohibited import under the Customs regulations. Successive Australian governments have stated that Australia will not accept the nuclear wastes of other countries for storage and disposal in Australia.

6.11 Financial Arrangements

The Draft EIS is missing information about the ownership of the waste. Chapter 4 does not discuss either change of ownership (if any or none) or the transfer of responsibility for the care of the waste from current location to the actual placement in the repository pit/trench hole. I recently suggested (August 2001 response to public discussion paper for the national store) that upon receipt, booking in and final inspection, 99% ownership (of waste) is then transferred to the Commonwealth agency that then has 100% responsibility. The ownership change from 99% to 100% occurs when the repository management has agreed that the particular waste item is suitable for the trench/pit/hole, so that a bill can be presented for additional payments arising from extra handling (conditioning) that may have been required.

The waste would be transferred to the ownership of the Commonwealth department that has responsibility for the national repository when the relevant department or its contractor takes possession of the waste. In the case of most waste producers, this would be when the waste is collected for transport to the repository.

Waste would only be collected for transport to the repository if it had been appropriately conditioned and assessed to meet the waste acceptance criteria for transport (and disposal). Confirmation that the waste acceptance criteria were satisfied would need to be signed by an appropriately qualified person and fully supported by accompanying documentation.

Further operational details will be outlined in the licence application to ARPANSA to operate the facility.

A detailed assessment of the Draft EIS for costs and benefits of the proposal indicated that its assessment of cost for the proposal is completely inadequate.

To date, over $5 million has been spent on the national repository, including money spent on siting studies, community consultation and environmental assessment.

Disposal charges will be set to cover the cost, or largely cover the cost, of disposal operations.

The Draft EIS has not estimated the cost of the dump and the financial arrangements to make it pay for itself. Charges should be set to encourage users of the dump to minimise their production of waste and its disposal.

Sutherland Shire Council's previous assessment indicated that the cost would be more in the order of $10,000 per cubic metre of low level radioactive waste, which leads to a cost in the order of $37 million for the proposed repository, based on existing waste levels. Ongoing costs based on the Draft EIS estimate future low level and short-lived intermediate level waste costing some $6–$26 million per annum (with the decommissioning of the Lucas Heights reactor). Hence, these potential costs should be clearly outlined in the EIS with respect to the relationship between design, waste disposal, costs and ways to change the cost requirements.

The costs associated with the national repository will be considerably less than those suggested. The Commonwealth is currently determining a cost recovery regime for the facility. It is expected that the cost of disposal operations would be recovered, or largely recovered, by charging disposal fees. The Commonwealth intends to set such fees to encourage use of the facility, while encouraging waste minimisation.

What are the costs to the Commonwealth and local communities associated with transport, security and management of radioactive waste movement and repository utilisation?

Costs associated with the transport, security and management of radioactive waste will comprise part of the costs of operation of the facility. These costs will be recovered or largely recovered during repository operations.

There should be no additional costs to communities associated with transporting radioactive waste.

The Draft EIS does not compare the cost of a repository to upgrading existing facilities.

The repository design and operation is based upon the NHMRC 1992 Code. The Code does not see continued storage of low level and short-lived intermediate level radioactive waste at existing facilities as a suitable long-term approach to the management of these wastes.

There is no insurance that provides cover for accidental radioactive contamination.

The issue of indemnity for houses contaminated during a transport accident is not considered.

What is the insurance situation in event of a transport accident?

In the extremely unlikely event of a transport accident, redress would be sought under the relevant domestic laws dealing with pollution and liability for harm to the environment.

Should the Commonwealth compensate any property holder who incurs damage or costs as a result of actions by protestors against the repository?

The Government must commit to fully compensating adjacent lessees for repairs to roads, fences and other infrastructure as well as the time involved in monitoring and managing protestor and media activities associated with the repository.

Compensation for damage or costs as a result of actions by protestors against the repository would be given consideration by the Commonwealth. Compensation could alternatively be obtained by legal action through the courts.

It is possible that the proposed location of the repository and any access road may affect current pastoral operations, including fence lines and watering points. The Commonwealth must commit to full compensation of costs incurred by a pastoralist to prevent disruption to existing operations as a result of the location of the repository.

Compensation will be addressed during the acquisition by the Commonwealth of the repository site. The compensation would take into account the effect the operation of the repository would have on the pastoral lease.

Chapter 7

Transport of Waste to the Repository

7.1 Introduction

A critical analysis of the Code for Transport was previously requested. This does not appear to have been undertaken and only general comments about safety of containers is provided.

The ARPANSA 2001 *Code of practice for the safe transport of radioactive material* (ARPANSA 2001 Code) is consistent with the most recent international standards and practice.

A review of the ARPANSA 2001 Code is beyond the scope of the EIS guidelines.

7.2 Proposed Transport Routes

Potential route selection from NSW and associated possible additional risk to the River Murray if an accident occurs on roads adjacent to the river (e.g. of vehicles using the Paringa Bridge which has no barrier preventing vehicles careering into the river in the event of an accident) is also of concern.

Communities along the transport routes are opposed to the repository and the transport of waste through their communities.

We are opposed to the transportation of radioactive waste across the Central Darling Shire.

What about the route across the Blue Mountains from Sydney? The road from Penrith to Lithgow is narrow, winding and dangerous.

I have concern over truck accidents along NSW route 'Option 2', which are of a large scale, often fatal.

The Calder Alternate Highway through Lockwood South is identified in the Draft EIS as being Transport Option 1. Whilst being called a major highway, the highway is in reality a road with characteristics of being a low level traffic thoroughfare of past eras. There is an unfortunate precedent of serious traffic accidents in the area. The risk factor of accidents of this section of road is just too high to plan for its use as a transport route.

The Draft EIS considered potential alternative road routes between the various capital cities and the proposed repository site. It established a preferred hierarchy of roads and highways over which trucks should operate, with this hierarchy reflecting relative standards of roads and hence reducing the likelihood of traffic accidents. Thus the priority was for routes to follow national highways, supplemented with state highways, and only using other roads for connectivity purposes.

Through NSW, for example, two broad route corridors were defined: via the Hume and Sturt Highways, or via the Great Western, Mitchell and Barrier Highways. Trucks carrying waste over either of these routes will at times necessarily travel adjacent to or across major inland waterways, including the River Murray. The route via the Hume and Sturt Highways forms part of the national highway network. Through Victoria two broad route corridors were defined: via the Calder Highway or via Horsham.

The waste packaging and the strict safety procedures for transporters (see below) would reduce the risk of major accidents, and the impact on people or the environment, to an extremely low rate.

Radioactive material is routinely shipped throughout Australia, across major rivers and waterways, without incident. Materials shipped include:

- smoke detectors for home and commercial use
- radioactive materials for medical diagnosis and treatment
- radioactive sources used in x-ray machines, for sterilisation and in industrial monitors.

WMC Limited regularly transports uranium oxide concentrate contained in 205 L drums, which are packed securely inside standard 6 m steel shipping containers, between Olympic Dam (near Roxby Downs) and Port Adelaide. These trucks pass through Port Augusta on the bridge across Spencer Gulf. Drivers of these vehicles follow strict safety procedures, and this has resulted in no known incidents since shipments began in 1988. Similar safety procedures would be set in place for contractors transporting waste to the national repository at Woomera.

As noted in Section 7.6.4 of the Draft EIS, the SA Government has emergency procedures in place in the event of a hazardous material spillage. The MFS and CFS have equipment and are trained in handling spillage clean-ups, and advice may be obtained from the Environment Protection Agency on spills involving radioactive material. The Commonwealth could also be called on for assistance if required.

The response to a spill into water would be up to the MFS and CFS to determine; however, the approach would be expected to be similar to the arrangements that the South Australian Government and WMC Limited have in place for the transport of uranium oxide concentrate from Olympic Dam to Adelaide (Kinhill Engineers 1997a).

The route proposed in option two will run parallel to the Murrumbidgee for a large distance and will also cross the river several times. What consideration has been given to the possible ramifications of an accident causing pollution of the river system?

The planned transport route passes through Wilcannia, which is situated on the Darling River. This represents an unacceptable risk that should an accident occur in the vicinity of the river, it would have major implications to this important river system.

The NSW Fire Brigade (NSWFB) is also responsible for land-based incidents and spillages on inland waterways including creeks, lakes, drains and others (Section 7.6.4 of the Draft EIS). To assist in combating incidents on water, the HAZMAT unit (part of the NSWFB) mains a rigid hulled inflatable boat at its depot at Greenacre, in Sydney, which responds to combat waterway spills, deploy booms, take readings or samples, and carry out other spillage response duties.

However, the conditioning and packaging of the waste would mean that any loss of radioactive material into a waterway following an accident is extremely unlikely.

Lack of information on the type of transport vehicle to be used and implications for possible splitting of the configuration of A-doubles (if used) is of concern.

The basis of the transport assessment in Chapter 7 of the Draft EIS, including determination of the number of vehicles to derive accident rates, is a truck carrying a single standard 6 m steel container. It is assumed that each container would carry a volume of 10 m^3 of waste, and the maximum weight would be 20 t (see Section 7.2.7 and Table 7.1 of the Draft EIS).

It is expected that standard semi-trailers would be used for the transport of the containers; the use of A-double or B-double trucks is not envisaged.

7.3 Transport Options

It was previously requested that all forms of transport be considered and not just trucks. Sea transport should be considered as a viable option for part of the route. There appears to have been no assessment of alternative transport routes.

It was previously requested that alternative methods to the transportation of waste by road be assessed. The general statement to the effect that a national store will ensure safety from theft or misuse of materials does not appear to have addressed the issue. I disagree that road transport is the best mode of choice, given that convenience may be overshadowed by potential accidents and hijacking potential.

The Draft EIS considered the following alternative modes of transport for carrying accumulated waste to the national repository near Woomera (see Section 7.3 of the Draft EIS):

- road transport for all aspects of the waste logistics chain
- rail transport for the major interstate movements of waste consignments, with truck transport to be used for:
  - collection of waste from existing storage sites
  - transport of consolidated/conditioned waste to railway freight centres
  - transport of waste from Pimba to the repository site.
- sea freight for movements between Tasmania and the mainland (this was considered a feasible option, given the regular freight service between Burnie and Melbourne).

The use of sea freight for transporting waste from capital city consolidation and conditioning facilities was considered, but rejected as not being feasible for a number of key reasons:

- There are no regular general freight coastal shipping services linking Australia's capital cities.
- Domestic container movements are not normally allowed on international container ships but exemptions can be obtained. Nevertheless, their potential use was rejected for a combination of reasons:
  - Service frequencies are low.
  - There are poor service linkages to Port Adelaide, where trans-shipment of containers to road transport would be required.
  - There would be reluctance by operators to carry containers of waste, mainly for political and cost reasons.
  - There is potential to lose a container overboard and, if this happened, there would be considerable difficulties in recovering it.
  - Additional handling of containers would be required (compared with road transport), adding to cost.

The advantages of road transport (Section 7.3, Draft EIS) are:

- relatively small loads would be transported from numerous storage sites, many located in regional areas
- partial loads would need to be consolidated at a limited number of centralised locations
- pick up, consolidation and transport of waste can be very flexible
- road transport can easily incorporate a continuous chain of custody of the movement of each load or partial load.

The use of rail transport as the primary transport method would still require road transport to the nearest railway station with freight loading facilities, meaning additional handling. The waste would need to be unloaded at the nearest railway siding to the repository (at Pimba, near Woomera) for transfer to trucks for transport to the repository.

A key security factor against rail transport is the poor chain of custody compared with road transport. As part of the licence application to ARPANSA, a threat assessment and

appropriate level of security for transport operations would be determined (see also Section 6.10 of this document). ARPANSA would assess whether the proposed arrangements were adequate.

It was previously requested that an analysis of alternate methods of transport be undertaken using the ESD principle and this does not appear to have been done.

Alternative methods of transport were considered in the Draft EIS (Section 7.3; see above).

7.4 Site Access Routes from Woomera

The Draft EIS does not address potential impacts arising from construction activities of roads including, if the need arises, the upgrading or realignment of existing roads.

The access from Woomera to each of the preferred and alternative sites is discussed in Section 7.4 of the Draft EIS. This discussion includes an assessment of the required upgrading of the access roads.

The upgrading works for access to the preferred site (Site 52a) would be quite minor; the access to the two alternative sites (Sites 40a and 45a) would be in the form of upgrades and repair of existing roads and tracks. However, these works would be minor compared with the routine repair and grading of outback roads in South Australia.

A discussion of the land systems (including dominant flora) to be traversed by the access roads is provided in the Draft EIS (Section 9.2.7) as are potential impacts of the construction works (Section 9.4). A discussion of the monitoring program and procedures is provided in Section 9.9, including a summary of the likely and potential impacts and risks (Table 9.7) and environmental safeguards to minimise impacts (Table 9.8).

No upgrading of any transport routes to Woomera (see Section 7.2 of the Draft EIS) would be necessary.

7.5 Community Consultation

There are concerns over the lack of consultation with communities in and around proposed routes and the lack of consideration to accident rates and implications.

There has been no option for the people of the Hay or Narrandera Shires to be directly involved in consultation or information sessions on this project — a project with the potential to impact significantly on their livelihoods.

Residents within the Sutherland Shire Council were largely unaware of the proposal — they have not had the full risks and consequences of the proposal adequately explained.

There have been no Commonwealth public meetings on the proposal and information has been lacking to communities in Mildura, Vic, and Dubbo, NSW.

The community consultation process adopted for the transport routes is described in Section 7.5 of the Draft EIS. The cities and towns at which community consultation was undertaken were determined in consultation with Environment Australia. It was not possible to visit every town and city along the proposed routes. However extensive information including the full Draft EIS was available on the DEST website, and the Draft EIS and website were advertised nationally.

The potential for accidents is discussed at some length in Section 7.6 of the Draft EIS. The assessment is based on data for truck accidents for various sections of the proposed routes. The risk of an accident involving a truck carrying waste to the national repository is small.

If an accident did occur, given the solid nature of the waste and the stringent packaging required by the ARPANSA 2001 Code the risk of distribution of radioactive material has been assessed as negligible.

The public consultation process undertaken with communities along the transport route was a low-key affair, which did not provide a forum for the public to adequately raise their concerns. It is strongly requested that further consultation be undertaken prior to any decision being made and that any future consultation be undertaken in a meaningful manner.

The only public 'community consultation' we have been aware of was a process which took place in Broken Hill. This was little more than an information stand at the local shopping centre on a weekday, which excluded all day-shift workers and school children from making enquiries and voicing their opinion.

The proposed transport routes through NSW and the rest of Australia for radioactive material do not indicate the levels of security involved or the proposal for the Commonwealth to interact with local communities with respect to information and local planning.

The Draft EIS pays little or no regard to the wishes of people who live near transport routes.

Communities along the transport routes will be at risk, and must be taken into account.

There are concerns regarding radioactive waste being transported through the communities of Port Augusta and Broken Hill.

Communities along transportation routes have made their opposition clear.

Consultation has been conducted along the transport routes, as discussed in Section 7.5 of the Draft EIS. Group discussions were held in Broken Hill, Port Augusta, Dubbo and Mildura. As with the broader population, individuals consulted along the transport route expressed a range of views on the proposal. Information days were also held in Broken Hill and Port Augusta.

Information provided to discussion groups (see Section 7.5 of the Draft EIS) described the long record of safe transport of radioactive material both in Australia and internationally.

Transport of radioactive waste to the national repository would be undertaken in compliance with the requirements of the ARPANSA 2001 Code. Given the stringent requirements required for the transport of radioactive waste, transport of this material is considerably less hazardous than the transport of flammable and corrosive materials.

In the unlikely event of a radiation-related accident, there are established arrangements provided for relevant emergency services to address the incident (see Section 7.6.4 of the Draft EIS).

The Draft EIS claims to have consulted community groups along the transport routes. This is not the case. Several local councils have declared their municipalities to be 'nuclear free zones' in demonstration of their opposition.

Broken Hill City Council has declared itself a nuclear free zone and is opposed to transport of waste through the city. No response has ever been provided when,

council has previously raised this issue and it is not satisfactory that council's position is totally ignored.

The Draft EIS does not account for local council and government opposition along the transport routes to the repository. The NSW Local Government Association passed a resolution at their 1999 Annual Conference that they 'oppose the transportation of any nuclear waste without the consent of the local government authorities'.

Community groups have been consulted along the major transport routes (see Section 7.5 of the Draft EIS).

Radioactive materials are routinely transported within and between major Australian cities and towns for a variety of purposes relating to normal day-to-day activities. Typically these materials are:

- contained in smoke detectors for home and commercial use
- used in hospital and dental surgeries for diagnostic purposes
- applied as part of industrial processes that use radioactive sources.

Shipments of these materials take place regularly and safely, without incident, including movements into/out of Broken Hill.

The low level waste materials that may be shipped through Broken Hill to the proposed repository are generally of a similar nature to those materials currently being transported into and out of Broken Hill as described above. They are thus consistent with what Broken Hill Council regards as acceptable under its nuclear free zone policy.

Furthermore, the waste shipments are to be significantly more securely packaged than commercial radioactive products, with items being conditioned and stored within prescribed packaging (205 L steel drums or other packaging). These containers will be packed within a 6 m steel shipping container or equivalent enclosure approved by ARPANSA. Truck operators would be specifically licensed to move the containers.

7.6 Transport Safety

A previous request for analysis of similar international vehicle movement and accidents was made and this has not been addressed.

Section 7.6.1 of the Draft EIS overviews a review of international accidents. It concludes that accident rates sourced from the USA, the UK and elsewhere for the movement of radioactive material are generally low. In fact rates for shipping other hazardous materials are significantly higher.

In considering the potential for accidents in moving the waste to the proposed repository, it is perhaps more relevant to explicitly consider traffic conditions and accident likelihood on the proposed routes linking Australian capital cities with the repository. This has been undertaken in detail as part of this EIS process (see Section 7.6.3 of the Draft EIS).

The analysis has estimated the probability of occurrence of an accident involving a truck carrying waste to the repository on an 'average' delivery trip to be 0.14%, a very low rate. The actual accident rate would be expected to be even lower as a consequence of the procedures that would be set in place for contractors transporting waste to the national repository at Woomera.

Road transport associated with the facility puts at risk large areas of productive agricultural land as well as communities.

Road transport of waste to the national repository will not put large areas of productive

agricultural land or communities at risk. Issues associated with the transport of waste to the facility are described in Chapter 7 of the Draft EIS. Only solid waste will be transported to the national repository in appropriate packaging and in compliance with the requirements of the ARPANSA 2001 Code. The stringency of these requirements will ensure that this form of transport does not provide a hazard to people or the environment.

About 30,000 radioactive packages are currently transported around Australia per year, so far without mishap. The international guidelines Australia adheres to require that radioactive material be packaged to ensure that it is contained in the event of an accident. Wastes destined for near surface disposal would travel in sealed containers approved by ARPANSA.

Road transport is dangerous with many variables. The transport of radioactive materials with its inevitable risk of accidents and spills should be undertaken only when conditions at the current site pose a greater ecological hazard than transportation.

It is totally ludicrous that a system of transport of such dangerous material is being considered.

The possibility of a road accident involving the transportation of this waste is real.

The distribution of radioactive waste around Australia means that road transport provides the most appropriate method of moving waste to the repository. The potential for accidents is discussed at some length in Section 7.6 of the Draft EIS. The risk of an accident involving a truck carrying waste to the national repository is small.

An accident may be any event from a minor incident such as hitting a kangaroo to a more serious accident such as a roll-over. Most accidents would be minor.

If an accident did occur, given the solid nature of the waste and the stringent packaging requirement of the ARPANSA 2001 Code the risk of distribution of radioactive material would be negligible.

WMC Limited's regular transportation of containers of uranium oxide concentrate from Olympic Dam to Port Adelaide operates within strict safety guidelines and to date there has not been a single traffic incident involving these trucks.

The risk analysis regarding the exposure from transport of waste through Broken Hill is considered to be insufficient. It is not acceptable that the blanket statement 'that containers are able to withstand accidents and therefore there is no risk of exposure' is considered to cover the issue.

In the first year over 130 truckloads of radioactive waste would potentially pass through Cental Darling Shire with further transports for the next 40 years. This would significantly increase the ongoing risk of any accident occurring.

There have been incidents of accidents involving radioactive waste in transit.

There have been numerous road accidents involving small amounts of radioactive material.

A spill could be near a major regional centre or else an environmentally sensitive area, with serious repercussions, which should speak for themselves.

The recent history of the Fisherman's Bend soil transport demonstrates the problems created by the movement of large volumes of radioactive waste.

A detailed risk assessment was undertaken to determine the risk of an accident during transport of waste to the repository. The accident analysis undertaken in the Draft EIS (Section 7.6) has demonstrated a low potential for an accident involving a truck carrying the

waste material. The probability of an accident occurring during an 'average' truck trip to the repository is estimated as 0.14%. More than 20 million packages containing radioactive material are safety transported throughout the world each year. About 30,000 radioactive packages are currently transported around Australia per year, so far without mishap.

Within a single urban area, such as Broken Hill, the risk of an accident will be much lower than this. There are many daily traffic movements of heavy trucks through the city, and the number of accidents involving these trucks within the city is comparatively few. The likelihood of incidental exposure associated with transport is addressed in Section 7.6.2 and again in Section 12.9.2 of the Draft EIS.

In considering this risk, it is pertinent to consider the safety record of WMC Limited in transporting shipping containers of uranium oxide concentrate (see above). The clean safety record is attributed to a combination of relatively low volumes of trucks (compared with local traffic) and truck drivers following safe driving procedures.

The dual packaging of the waste material is specifically designed to minimise any distribution of solid material in the event of an accident and the likelihood for a spill in the low travel speed environment is considered to be extremely low.

I feel that the Draft EIS seriously underestimates the possibility of a road accident. It states that 'the accumulated waste backlog is estimated to be 171 truckloads' and that 'this represents a very small number of truck movements over the road network'. By whose definition is it decided that this is 'very small'? The dangerous nature of the material must be considered and not counted as 'normal' cartage.

The Draft EIS used actual truck accident data for individual road sections in the calculation of the overall estimated truck accident rate (see Table 7.3 of the Draft EIS). The detail on the type of freight carried by trucks involved in accidents is not recorded. The total number of trucks that would be involved in transporting the existing inventory (171) is quite low in comparison with total truck movements.

For example, at the bridge at the tip of Spencer Gulf, at Port Augusta, the total average daily truck movements are 760, or about 277,000 per annum. Thus, at the Port Augusta bridge, the proportion of trucks transporting the existing waste inventory to the repository compared with total truck movements over the bridge for a full year would be 0.06%. This proportion would be greatly reduced for future waste shipments after the initial campaign.

Clarify the 23% risk of one truck accident moving the existing inventory to Woomera.

The risk of an accident occurring during transport of waste to the repository has been discussed in Section 7.6 of the Draft EIS. There has some misunderstanding related to the risk of transport accidents and the risk of environmental contamination as a result of any potential road accident.

The Draft EIS stated that there was approximately a 23% chance that one of 171 trucks taking waste to the repository in the first disposal campaign could have an accident. This would include minor accidents causing no disruption to the waste cargo. This is equivalent to the probability of an accident occurring during an 'average' truck trip to the repository of 0.14%, a very low likelihood. The risk of an incident involving waste shipments is significantly lower than the potential for an accident involving other hazardous materials.

Have the emergency services been consulted?

Firefighters, MFS, SAS and Police are concerned that they have not been consulted regarding the repository proposal.

The authorities responsible for emergency services in each state were consulted to obtain information on their emergency response plans and procedures for dealing with accidental radioactive waste spillage during transport (see Section 7.6.4 of the Draft EIS).

Emergency response departments (police, fire brigade and paramedics unions) are all refusing to be involved in the cleaning up of an accident involving nuclear waste.

The Firefighters Union recommends a ban on attending accidents involving radioactive waste because of obvious concerns about the health and safety of its members and believes that there is no protocol to deal with this type of accident.

The transportation of radioactive waste would place significant demands on regional emergency services, in terms of planning, resources and response.

The South Australian Government, despite not being a party to the current EIS and assessment process, will be required to undertake clean-up operations should there be a radioactive spill.

There is a risk that communities and environments located along the transport route will be impacted on by an accident or contamination. Transport of waste from various locations poses a very real potential danger to anyone who lives in the vicinity of these routes.

Recently a petrol tanker overturned in New South Wales and there was enormous concern about the safety of local citizens, the environment and all those likely to be affected. If such an incident were to occur to a truck carrying nuclear waste, the consequences could indeed be catastrophic. Even if the incidence of such an accident is considered to be remote, the precautionary principle must be invoked for even one serious accident would be too many.

If state authorities are unduly concerned about the transport of low level waste material it is suggested that they should be consistent and attend to improving the safety of genuinely hazardous cargoes first e.g. petrol, gas and industrial chemicals.

Radiation suits are not easily available in sufficient numbers for all who might attend (an accident or incident). This would become worse with increasing distance from major centres.

Emergency response to incidents involving hazardous materials, including radioactive waste, is a matter for the relevant state or territory emergency services, and is comprehensively covered by existing emergency planning arrangements. Section 7.6.4 of the Draft EIS describes response procedures for each relevant state and territory. In summary, each state and territory has comprehensive disaster response plans in place designed to:

- respond to incidents involving accidents involving trucks carrying hazardous materials
- contain any spillages of materials
- clean up any spillage.

In most emergency situations, the police, ambulance, fire services and state or territory emergency services are the first responders. The fire services maintain specialised HAZMAT teams trained to deal with chemical, biological and radiological incidents, and possessing the appropriate equipment for dealing with such incidents. Units within each respective state or territory provide specialist inputs on radiation matters.

The risk of spillage of waste material from the proposed shipments during transportation is considered to be very low because of the following factors:

- No liquids would be transported.
- Active radioactive materials would be conditioned with concrete and stored in drums.
- Drums would be packed securely inside shipping containers or equivalent enclosures for long distance movements.
- Stringent safety procedures would apply to actual on-road movement of the containers.

The Commonwealth can provide assistance on request from the states or territories to Emergency Management Australia (EMA). ARPANSA and ANSTO also maintain trained radiation emergency response teams that can provide assistance on request from state or territory authorities.

There is a question regarding the ability of the regional emergency services to provide an adequate response should there be an accident. Little consolation can be can be gained from the advice in the Draft EIS that HAZMAT stations in Sydney, Newcastle and Wollongong are staffed by 90 specially trained fire-fighters. In the event of an accident occurring in the Hay region, where would the response units come from and what would be the consequences of the delays in arriving at the accident scene?

The Narrandera region is not equipped to deal with an emergency situation involving radioactive waste. By the time emergency services arrive on the scene from Sydney, Newcastle or Wollongong, the damage will have already occurred.

Analysis of the capability of emergency services within the Broken Hill region has been requested previously. The statement provided in the Draft EIS that fire services are equipped for dealing with radioactive incidents is considered to be unsatisfactory. Whilst the fire brigade may be trained, it has been forgotten that most of the towns along the transport route are volunteer brigades and as such are generally less able to meet the same standards as town brigades. Also the distances between towns can result in long response times in the event of an emergency.

Emergency response procedures in NSW are well-established and would enable an appropriate response in an emergency situation involving radioactive materials.

The following response could be expected if an incident occurred in NSW:

- The initial response would be by the NSWFB from one of 330 fire stations throughout the state. The attending unit would assess the nature of the specific incident, and contain the materials. Trucks carrying the radioactive waste would be clearly marked as such, enabling the NSWFB unit first on the scene to declare an exclusion zone around the incident site. NSWFB services have extensive experience in responding to emergency incidents, typically managing some 12,000 spillages, leaks or other HAZMAT incidents per year throughout the state.
- A HAZMAT response unit would be summoned to the incident site. The HAZMAT units located in Sydney, Newcastle and Wollongong are on 24-hour call, and carry all necessary equipment to render safe any hazardous materials incident. In addition, there are now 15 intermediate stations where a substantial level of HAZMAT equipment is maintained. The closest station to Hay is Griffith, some 145 km away. It is understood that these locations meet the needs of the NSW Government in the event of hazardous materials incidents. In addition, every fire station in NSW has basic HAZMAT equipment. This level of equipment is adequate for crews to contain spillages of hazardous materials (including radioactive waste).
- The NSW Police Service would assume control of the emergency site in support of the NSWFB, and coordinate the support required by the HAZMAT Controller before and after the controllers arrival at the scene.
- Representatives from the Radiation Control Section of the NSW Environment Protection Authority would also attend the scene, and provide specialist assistance and advice.

The emergency response procedure in the event of a radioactive material incident in Hay or Narrandera would initially involve the NSWFB HAZMAT team from Griffith, who would then, under the requirements of the NSW Hazardous Materials Emergency Sub-Plan, call in a unit from one of the three primary HAZMAT stations for advice and/or assistance depending on the nature of the incident.

These high standard arrangements by emergency services in NSW would also be capable of responding to a radioactive waste incident in the Broken Hill region.

How can we be sure that vehicles carrying nuclear waste will adhere to regulations?

The Draft EIS states that 'signs must be placed on vehicles carrying nuclear waste' but in an accident near Melbourne (in the last 2 years) involving an unmarked truck transporting nuclear waste material, emergency workers were surprised at the contents of the truck. How can we be sure that vehicles will adhere to regulations (e.g. signage about contents)?

There are strict regulations and codes in force in Australia, consistent with international practice, for the packaging, handling and transport of radioactive material. The risk associated with transport of radioactive waste is far less than that associated with the transport of other hazardous materials such as flammable and corrosive substances.

Contractors specifically licensed for the task will ship waste materials to the proposed repository. As a condition of their contracts, the operators will be required to undertake compulsory training relating to the various steps in the waste handling process, including:

- physical handling of the individual drums containing the conditioned waste
- packing the drums into shipping containers or equivalent enclosures approved by ARPANSA
- signing of the trucks carrying the containers, in accordance with the requirements of the *Australian code for the transport of dangerous goods by road and rail* (Advisory Committee on the Transport of Dangerous Goods 1998)
- safety and reporting procedures while en route to the repository
- unloading of the containers at the repository.

Performance of trucking operators in adhering to the strict conditions of contract will be monitored to ensure compliance in all respects.

Waste will only be transported infrequently to the national repository. Internationally and in Australia there has been a long record of safe transport of radioactive substances. In Australia these substances (e.g. medical isotopes) are transported on a daily basis without incident.

The reference in the Draft EIS to rail and road accident rates and to difficulties with spilling 'solid material' does not satisfactorily consider the possibility of radioactive dust risk from spilled solid material.

The conditioning of the waste, and the dual system of waste containment during transport using drums or equivalent packaging, then in a shipping container or similar enclosure, and the secure packing for transport will make it extremely unlikely that there would be any escape of dust in the event of a major accident.

We should ban multiple transportation of 1000s of litres of radioactive waste across Australia

The waste would not be transported in liquid form.

The transport of this material would be eliminated if the concept of a single central waste dump far away from the place of production were to be scrapped. The waste should remain near its place of production in order to ensure that this dangerous, long-lived poison would be constantly monitored.

One of the key reasons for storing low level waste in a national repository is to improve long-term safety. Currently, packages of waste material are stored in numerous places throughout urban and regional areas, much of it in areas of potential exposure to employees. In many cases, materials are stored in cardboard boxes, hidden in cupboards, in lift wells and under stairs. These clearly represent unsafe working environments for employees.

The repository will enable existing radioactive waste materials to be collected, consolidated and conditioned into suitable containers for long-term storage. The proposed repository is located in a remote area, in a geologically stable environment. Removal of existing waste to this location will thus provide a significant benefit to persons currently impacted by local unsafe storage.

The accumulated waste needs to be transported to the repository. While there is a low level risk involved in this transportation process, the longer-term benefits of safely storing the waste in a remote location considerably outweigh this risk.

Chapter 8

Physical Environment

8.1 Geology

Figure 8.2 (Geology and watertable contours) is reproduced in the Errata at a slightly larger scale to improve legibility.

The approach to the earthworks assessment is inadequate compared with other assessment undertaken in Australia and with international best practice. For example, the assessment is focused upon whether buildings can withstand earthquake rather than how earthquakes may disrupt the design structures and allow access of groundwater or air to the deposited materials.

The dump site may be affected by an earthquake or tremor.

The assessment indicated that recorded magnitudes of earthquakes in the area of the proposed repository were low. It is considered that there is an acceptably low risk that an earthquake could cause significant movement in the foundations of the repository or result in a rupture of the cap. Appropriate ground acceleration coefficients would be adopted in the final design of the repository.

The assumptions made on the nature and characteristics of the geological units (including soils) are questionable. The site is more likely to be characterised as a fractured rock or double porosity medium, rather than a porous medium as assumed in the Draft EIS. There are implications on the fate of any potential leachate at the site due to the complex nature and different behaviours of fractured rock aquifers.

Will all effective information on site geology be available to the community including the South Australian Government?

The Commonwealth's Bureau of Resource Sciences has investigated the geology of the area in detail. A summary of this information is provided in Sections 8.1 and 8.3 of the Draft EIS, and map of local geology is provided in Figure 8.2. Further information is available from previous study phases and in other reports on DEST's website.

Detailed modelling of the potential for infiltration of water and generation of leachate has been undertaken using engineering parameters determined from laboratory tests on actual soil samples from the preferred and alternative sites, as described in Appendices C4 and C5 of the Draft EIS, and summarised in Section 8.5.6. The results of the modelling indicate concentrations at the base of the repository of the selected radionuclides modelled to be so low as to be effectively undetectable (see Table C5.4 of the Draft EIS).

With respect to contaminant movement, transport in the unsaturated zone is the limiting factor. In the unsaturated zone, water is held in small pores only and not in any larger fissures, such that a porous medium model may be applied. Analytical calculations of (saturated) groundwater flow were made on a regional basis. As noted in Section 8.5.2 of the Draft EIS, on the scale of the Stuart Shelf it may reasonably be expected that the regional aquifer behaves as a single, continuous regional flow system rather than a compartmentalised system, notwithstanding its fractured nature on smaller scales.

8.2 Geomorphology

No comments were received on this topic.

8.3 Soils

No comments were received on this topic.

8.4 Surface Hydrology

There is a lack of stream flow information in the site area.

Site hydrology was included in the criteria used in the site selection process. The preferred site and alternatives do not contain significant drainage features. Site 52a is on a topographic high, and the other two sites have minor on-flow of water from adjacent areas (see Section 8.4 and Figure 8.2 of the Draft EIS).

In Section 8.4 it is stated: 'Surface water drainage is internal to salt lakes'. However on the same page it is stated that Site 52a drains to Lake Koolymilka and Site 40a drains to the northeast to an area without major salt lakes.

Although the Arcoona Tableland does shed water to major salt lakes, much of the runoff and indeed the runoff from at least two of the potential sites, terminates in smaller fresh or brackish lakes or swamps. These smaller lakes and swamps are very important, both biologically and as a food and water source for stock and kangaroos. The biological and pastoral values for the drainage termini for each of the sites should be identified. Specific management and monitoring programs should be instigated to minimise impacts to flow and of contaminants to these termini as a result of onsite ground works and road construction.

Surface water features that, on occasions after significant rainfall, contain fresh water are not fed by the deep, saline groundwater present beneath the area. Their significance to biota is acknowledged and their protection included in the environmental management strategy for the site. Koolymilka Lake is an example of a small to medium sized named salt lake, the local terminus of surface runoff from Site 52a.

The creek system draining Site 40a terminates in another salt lake of comparable size, Lake Richardson (although this is not named in the Draft EIS). Examination of the depth to watertable and groundwater salinity maps (Figures 8.5 and 8.6 in the Draft EIS) confirm the status of these salt lakes as associated with the saline watertable aquifer.

The 1:25,000 topographical maps of the area show surface water storages or water holes associated with some of the drainage lines in the region. The protection of these ephemeral resources will be addressed in the EMMP for the eventually chosen site.

The environmental management and monitoring strategy for the site, during construction, operation and beyond, is given in Chapter 13 of the Draft EIS.

8.5 Hydrogeology

Concerns have been raised regarding the potential impacts of the project on groundwater, affecting the people who rely on it for drinking water or produce foodstuffs.

The potential impact of the national repository on groundwater has been discussed at length in Section 8.5. The deep saline groundwater, combined with the geology, hydrology and arid climate makes this region ideal for the national repository. The water is too saline for use by people or in industry or agriculture.

It would take thousands of years for water from the surface at the repository site to reach the groundwater level, and thousands of years for the water to move to the nearest discharge point. It will only take a few hundred years for the radioactivity of the waste to decrease to background levels.

There are large reserves of life-sustaining groundwater in the South Australian desert region in the Great Artesian Basin. This water resource is critical for all human activity as well as for the unique mound springs, plant and animal life in the area. If radionuclides leak from the proposed waste dump, huge tracts of groundwater may be permanently contaminated.

Water is a precious resource and is highly likely to be contaminated underground and above-ground. The Great Artesian Basin is also likely to be affected.

There is a risk to the water resource of the Great Artesian Basin.

It is outrageous that there are even plans in the making for radioactive dumping in an area of vital importance for groundwater reserves.

The preferred site and two alternatives being considered for the national repository are not within and are not connected to the Great Artesian Basin (see Sections 8.4 and 8.5 of the Draft EIS). The local groundwater is too saline for use by people or in industry or agriculture.

Limited understanding of undergroundwater issues means any watertable figures are dubious.

There has been a great deal of rigorous scientific study of the groundwater characteristics of the central–north region of South Australia and behaviour of groundwater at the proposed sites is well understood. Details are given in Section 8.5 of the Draft EIS.

'The overall groundwater movement in the area is towards Lake Torrens' — Our community of Andamooka is in close proximity to Lake Torrens and is an old and well-known opal mining community, with the belief that Australian opal will be mined for 1000s of years. Why put a radioactive waste repository, that will contaminate the ground for 1000s of years, in an area that will be used for 1000s of years?

Because of the nature of the wastes that will be incorporated into the repository, it will only take a few hundred years for the radioactivity of the waste to decrease to background levels, not thousands, and this decay will occur within the repository or, under a worst-case scenario, in the first several metres of unsaturated zone beneath the repository (not in the underlying aquifer). Thus the effect to down-gradient areas will likewise be at background levels (see also above).

There are few practising hydrogeologists in this country and this science is of paramount importance in monitoring the groundwater in respect of its present state and the likelihood of any leakage into the aquifer. What is being done to ensure the groundwater is being monitored?

The environmental management and monitoring strategy for the site, during construction, operation and beyond, is given in Chapter 13 of the Draft EIS. Groundwater monitoring requirements including reporting obligations will be incorporated into the site's licence conditions.

There is an error on page 16 of the Draft EIS Summary. ^{238}U and ^{241}Am (in smoke detectors) do not have a half-life less than 30 years. This is misleading in the context of groundwater movement as the half-life is near the 60,000 and 6000 years. In the long term who will clean up Lake Torrens?

The half-lives of the radionuclides to be stored in the repository are typically 30 years, although for some radionuclides the half-life is longer. The NHMRC 1992 Code allows for

the disposal of very low levels of radionuclides with longer half-lives in a near-surface repository.

Domestic smoke detectors, owing to the small amount of ^{241}Am used in them, can be disposed of individually in normal municipal landfills in some states. Uranium is present as background in soils at levels of 2–4 parts per million. The very small quantities of uranium that will be disposed of in the repository will not be significantly above this background level.

The 60,000 and 6000 year time periods relate to estimates by CSIRO and ANSTO in 1998 and 1999 of the time for water to reach the groundwater table in the presence of vegetation and in the absence of vegetation respectively (Section 8.10.3 of the Draft EIS). Note these times are not the transit time of water reaching Lake Torrens — that is considerably longer.

The detailed water modelling undertaken for this EIS using actual soil samples from the sites is described in detail in Appendices C4 and C5 of the Draft EIS, and summarised in Section 8.5.6. The detailed results indicate concentrations at the base of the repository of the selected radionuclides modelled would be so low as to be effectively undetectable (see Table C5.4 of the Draft EIS).

When the half-lives of radionuclides to be stored in the repository are compared with the transit times demonstrated in the modelling, the conclusion of the Draft EIS is correct.

The proposed waste dump has the potential to contaminate groundwater.

The proposed dump may leak.

Huge tracts of groundwater may be permanently contaminated.

As noted above, the detailed water modelling undertaken for this EIS using actual soil samples from the sites (described in detail in Appendices C4 and C5 of the Draft EIS, and summarised in Section 8.5.6) indicates concentrations of the selected radionuclides modelled would be so low at the base of the repository as to be effectively undetectable (see Table C5.4 of the Draft EIS).

8.6 Climate

There is no assessment of the impacts on site hydrology that may occur as a result of accelerated climate change resulting from global warming and the associated implications for site design criteria.

The risk assessment based on assumptions of environmental stability is already being challenged by global warming.

What is the weather in this region going to be like in 25 years let alone 125 years and what rainfall will it receive?

Although the Draft EIS suggests that this is a low water area, it is hopeful science that this will remain that way.

Climate change and other factors may cause significant reassessment of this land and its potential use over its proposed life and in the post-operations phase.

The potential impact of global warming is addressed in some detail in the Draft EIS in Sections 8.6.2 and 12.8.3, and Appendices E and F. Appendix F is a detailed assessment by CSIRO on the potential impact of climate change on the Woomera area, for timeframes of up to 10,000 years.

The report concluded that there is no reason to expect that there will be substantial changes within this time frame. This time frame is very long compared with the period for institutional control after closure of the repository (200 years), and the half-lives of the major component of the radionuclides proposed to be disposed of in the repository (typically 30 years).

Couldn't increased rain or increased aridity exacerbate problems? How can predictions over 10,000 years possibly be made?

Long-term, future climate prediction is an accepted scientific technique that has been widely used for decades to predict likely changes in the future. The technique is based on careful, detailed, observations about past climate and weather patterns throughout the world.

The Draft EIS does not provide for a continuous rainfall record to be maintained for the life of the project with ongoing review and analysis.

The Commonwealth maintains meteorological monitoring stations at Woomera aerodrome and Andamooka. Summary data are provided in Section 8.6 and Tables 8.10 and 8.11 of the Draft EIS. The need for any additional meteorological monitoring would be considered during development of the EMMP, as part of the ARPANSA licensing process.

8.7 Air Quality

No comments were received on this topic.

8.8 Noise

No comments were received on this topic.

8.9 Fire Regimes

No comments were received on this topic.

8.10 Impacts, Risks and Safeguards During Construction and Operation

The Draft EIS has not determined nor established a groundwater exclusion zone.

The 1.5 x 1.5 km buffer zone would act as a groundwater exclusion zone (see Section 6.1.5 and Figures 6.1 and 6.2 of the Draft EIS). As noted above, the results of water modelling using actual soil samples from the preferred and alternative sites indicate concentrations at the base of the repository of the selected radionuclides modelled would be so low as to be effectively undetectable (see Table C5.4 of the Draft EIS).

8.11 Impacts, Risks and Safeguards During Surveillance, Decommissioning and Institutional Control

No comments were received on this topic.

8.12 Monitoring Programs and Procedures

No comments were received on this topic.

Chapter 9

Biological Environment

9.1 Biological Diversity

The fragile environment would suffer from radioactive waste.

The dump is potentially disastrous for the ecology of the area.

The detailed studies and assessment undertaken for the Draft EIS found no evidence to support these conclusions (see Chapter 9 of the Draft EIS).

Many creatures and plants are in the area and are exclusive to the area.

A full description of the plants and animals of the region, including conservation status, is provided in the Draft EIS text (see Chapter 9 and Appendices D1 and D2).

9.2 Vegetation and Flora

No comments were received on this topic.

9.3 Fauna

The Draft EIS Summary (page 18) states that five threatened animal species were recorded within the project area, with one being rated as vulnerable under the EPBC Act.

Five species of conservation significance were recorded. The plains rat is listed as vulnerable under both the Commonwealth's EPBC Act and South Australian legislation; the other four species listed under South Australian legislation are the Australian bustard (vulnerable), peregrine falcon (rare), Forrest's mouse (rare) and narrow-nosed planigale (uncommon). This is described fully in Appendix D2; and listed in Table D2.14.

Re the* Notomys fuscus *(dusky hopping-mouse) reported by Kinhill (1997) from near Olympic Dam (Section 9.3.5 of the Draft EIS). The Kinhill reference actually correctly states that due to the absence of recent recordings the probability of it occurring in the region is low or nil.

This is noted and recorded in the Errata (Appendix C) of the supplement.

The data for species recorded from surveys (fauna lists in Appendix D — Attachments A, B and C) has been largely or totally omitted from these tables. This oversight can be mostly rectified by referring to the text and other tables but may cause particular confusion to future users of the report.

These data were omitted because of an error translating files in the printing process. The complete tables are included in the Errata (Appendix C).

9.4 Impacts and Risks – Construction

There is insufficient detail to ensure there is no entrapment of or danger to native animals at the facility.

The 1.5 x 1.5 km buffer zone around the repository would be a fenced exclusion zone from which large, grazing and feral animals would be excluded (see Section 6.1.5 and Figure 6.2 of the Draft EIS). A separate animal-proof fence would be provided around the 100 x 100 m repository site.

The trench would be quite large (approximately 12 m wide at the base) with a vehicle access ramp, which would allow animals to escape the trench. Boreholes would be constructed and filled within a few days, and would be secured with bunting and covered between shifts for safety and to prevent animals falling into the borehole.

9.5 Impacts and Risks – Operation

No comments were received on this topic.

9.6 Impacts and Risks – Surveillance

No comments were received on this topic.

9.7 Impacts and Risks – Decommissioning and Institutional Control

No comments were received on this topic.

9.8 Environmental Safeguards to Minimise Impacts

No comments were received on this topic.

9.9 Monitoring Program and Procedures

No comments were received on this topic.

Chapter 10

Land Use and Activity

10.1 Overview

No comments were received on this topic.

10.2 Site Planning

No comments were received on this topic.

10.3 Visual and Landscape Considerations

No comments were received on this topic.

10.4 Land Use and Demographics

Liberal Senator Grant Chapman launched a media campaign in 1995 protesting storage of radioactive waste in Woomera on the grounds that it would jeopardise the commercial space industry. Was Senator Chapman wrong then, or is the Government wrong now, or will you just skate over contradictions like that in the final EIS?

Comments made at different stages of a project's lifecycle are taken into account as part of the iterative design of a project. Section 10.4 of the Draft EIS considers land uses on the WPA. The conclusion of the Draft EIS is that the siting of the national repository on Site 52a can be accommodated in the overall use of the range, just as the current storage of radioactive waste on the WPA has been accommodated.

The Federal ALP Government sent radioactive waste to Woomera in the mid-90s as an 'interim' measure, now the presence of that waste is being used to support a repository in the same region ('consistent use'), so if a repository is established then expansion of nuclear activities in the region can/will be justified with this 'consistent use' argument.

The fact that 'lightly contaminated soil' has been stored at Woomera since 1995 is hardly reason to compound the problem of dumping more highly radioactive material.

The Woomera area emerged as the preferred location for siting the repository after a rigorous three-stage public process over 10 years, involving consideration of 13 factors such as geology, climate, groundwater (see Sections 5.1 and 5.2 of the Draft EIS). The locations of existing waste were not a factor in this selection exercise.

The Draft EIS does not take account of the nation's socio-economic landscape for the next 20 years, nor of the economic impact of the site.

The repository would not have any impact on the State's socio-economic landscape. It would be located in a pastoral area, with low productivity per square kilometre, and the area of the repository and its buffer zone (total 2.25 km^2) would be very small in relation to pastoral holdings in the area.

The potential for other agricultural use is limited, because rainwater is very limited and unreliable and evaporation is high; the underground water is highly saline and undrinkable by humans or animals. The groundwater is also not connected to the Great Artesian Basin. Geological investigation indicates no mineral prospects in the proposed region.

Our company has a contractual obligation and a strong corporate commitment to the marketing and increased commercial use of the WPA, and ensuring that the WPA retains the ability to support a wide range of aerospace programs without adverse encumbrances. There are concerns that the proposed Site 52a is located in the WPA, but more importantly that it is within the Woomera Instrumented Range (WIR). The proposed repository is not 'consistent with the existing land use' and, by implication, the repository is not a compatible activity.

The establishment of the repository at Site 52a will, at the very least, expose the repository to dangerous hazards that do not exist at Sites 40a and 45a.

The proximity to the ballistics weapons site at Woomera leads to a potential risk for accidental explosion that is surprisingly high.

A national repository in Site 52a is incompatible with our company's plans to trial larger single-stage and two-stage solid propellant rockets. Trials are expected to begin in 2003, as are innovative hybrid rocket (liquid oxidiser, solid fuel) trials. We are also developing a large liquid fuelled sounding rocket and a smaller rocket, which have aroused interest among the scientific community. We have several letters of interest from scientists wishing to use these rockets in hypersonic, microgravity, ionospheric and avionics studies. During initial flight testing the reliability of these rockets will be unknown and they might well pose a threat to the repository in the event of a mishap. We are also pursuing partnerships with overseas groups who are seeking sites to trial their large rockets. The presence of the repository in the test area would make the opportunity of testing in the WIR less attractive, or the insurance unaffordable or unobtainable. These activities would threaten and be severely threatened by such a repository.

The risk assessment described in Section 10.7.5 of the Draft EIS uses the Department of Defence endorsed methodology to assess the risk of the repository being struck by a projectile with sufficient energy to result in a release of radioactive material. This assessment indicates that the risk is low and within acceptable operational parameters. On this basis, the presence of the repository at Site 52a is not considered an 'adverse encumbrance' on commercial use of the WPA.

The establishment of the repository at Site 52a will, at the very least, seriously impede the development, conduct and growth of the new business in the WPA.

There is real concern that the 'perceived risk' associated with the repository could deter prospective clients of the WPA.

The proposal to site a radioactive waste repository near the launch and target areas of a rocket range is illogical and dangerous. The WIR/WPA is vital to the advancement of Australian space science and technology. A national radioactive waste repository at Site 52a will adversely affect the useability of the WIR/WPA and, consequently the future development of Australian space science and technology. We urge the selection of sites more distant from the test range.

No evidence was sighted during the preparation of the Draft EIS to suggest that these assertions are correct. New business in the WPA has continued despite the radioactive waste currently stored at two sites in the WPA.

The Draft EIS risk analysis has only been based on the current year trials and short-term plans, not the 250-year repository lifetime. There is a failure in the Draft EIS to consider the effect of the repository on potential future WIR activities.

There appears to be no consideration in the Draft EIS of future WIR activities for which the mishap risk levels may be significantly higher than those of current WIR activities. Over the past 50 years the nature of trials and space launch activities at Woomera has changed frequently. No one can tell what new technologies may develop or what tests etc may be required over the next 250 years. Current re-entry vehicle, solid-propellant sensitivity, supersonic gliding tests and scramjet tests for example were not foreseen when the range was first built. To analyse the long-term risk based on year 2002 RAAF weapons trials is not realistic.

It is not possible to predict with accuracy the likely nature of weapons trials and space launch activities over an extended period. However, the past 50 years have seen substantial improvements in weapon and space vehicle design, as well as the development of sophisticated computer-based design and simulation tools.

These tools have meant that the behaviour of weapons and space vehicles has become far more reliable over time. In addition, the use of computer simulation means that behaviour can be predicted much more accurately in the design stage, even before trials take place.

It is reasonable to assume that such improvements will continue and that the behaviour of weapons and space vehicles will continue to increase in reliability and predictability. This means that the likelihood of trial failure and therefore the size of safety templates can reasonably be expected to decrease. Risk assessments based on the behaviour of current weapons and vehicles can therefore be considered conservative.

The location of the repository at Site 52a will increase liability concerns and will lead to increased insurance premiums for clients, rejection of trials and the forcing of non-optimum flight paths, which will seriously affect the competitive advantages offered by the WPA.

Trials planning is based largely on the likelihood of the worst possible outcome. The presence of the repository in the WIR would mean that one consequence of a mishap could be the dispersal of low level radioactive waste. It is therefore highly likely that many future trials would not be permitted or would have to be adversely modified, trials insurance would either become more expensive or unavailable and potential WIR users would seek alternative sites, probably overseas, thus denying a financial benefit to Australia and potentially retarding the development of Australian space science and technology.

No evidence was sighted during the preparation of the Draft EIS to suggest that these assertions are correct. In terms of perceived risk, it should be noted that past decisions on siting radioactive waste stores have not had the benefit of the objective risk analysis work that has been undertaken in the preparation of the Draft EIS. As noted above, new business in the WPA has continued despite the radioactive waste currently stored at two sites in the WPA.

Use of the WPA would potentially limit live firing and rocket testing there, as there would be a small risk that the repository could be hit during future trials.

There are concerns that Site 52a has unique characteristics, which are ideally suited to safe landing for test vehicles. Hence the location of the repository at Site 52a will preclude future deliberate landings of test vehicles in the optimum recovery region due to the accidental landing or impact within the adjacent repository precinct.

Trials have been conducted in the WPA for more than 50 years and it is estimated that the Australian investment in Woomera has totalled over $2 billion in 1989 dollars (Morton, P. 1989. Fire Across the Desert. AGPS. p 546). The WIR/WPA is therefore a valuable national asset. A national radioactive waste repository, which we believe is fundamentally incompatible with rocket and weapons trials activities, will diminish the ongoing value of this asset, arguably the safest place on Earth to conduct trials activities.

No evidence was sighted during the preparation of the Draft EIS to suggest that these assertions are correct. Radioactive waste has been safely stored in two locations on the WPA close to Site 52a without incident since 1994–95. The Department of Defence has been able to combine its use of the WPA with the storage of the radioactive waste on the WIR.

A risk assessment undertaken as part of the Draft EIS found that the risk of the repository being hit is remote and, if it were hit, the environmental consequences would be minimal. For radioactivity to be released into the biosphere, a breach of at least 5 m of cap material and consolidated fill, plus the containment structure of the waste would be needed.

In regard to safe landing of test vehicles: the NEXST-1 landing area in the submission (which is assumed to include an appropriate safety template) does not overlap either Site 52a or the Range E Target Area.

In the past year the WIR has been used significantly for missile firings, drone launches, sounding rocket launches and Japanese National Experimental Supersonic Transport launches

The submission gives examples of a number of recent range activities:

- ASRAAM is the AIM-132 Air-to-Air Missile. In studies for the Draft EIS this weapon was identified as not being a weapon that has the potential to penetrate the repository. It is not fired at ground targets and is designed to disrupt airframe structures through blast effects. It is expected to cause minor fragmentation on ground impact, without penetration.
- Kalkara is not a missile but an unmanned aerial vehicle. It flies like an aircraft under guidance and is then landed by parachute.
- HyShot is the University of Queensland scramjet trial. The trial vehicle is designed to fly some 130 km down-range and does not impact in the vicinity of Site 52a.

The 'perceived risk' of radiation exposure has prevented use of specific areas in the WPA by the German Space Agency, the Japanese National Space Development Agency and NASA.

The German Space Agency considered the possible placement of a temporary radar tracking station at Maralinga, not Woomera, in the 1990s. The full reasons for the German Space Agency decision to not proceed are not known; however it is not reasonable to extrapolate that the same decision would have been made in the case of the repository, as the issues are very different.

It is not known what factors were relevant to the elimination of Evatts Field as an acceptable site for the Japanese National Space Development Agency ALFLEX spaceplane landing trials, in the 1990s. In any case, the situation at Evatts Field at the time related to waste being temporarily stored above-ground in a non-purpose built building (a hangar) located relatively close to the runway centreline. The national repository would be an engineered, monitored, below-ground low level waste repository located some distance from the Range E target area.

NASA is not proceeding with the X-38 proposal for reasons unrelated to the national repository.

Locating the repository in the WIR is at complete variance with the statement on page 94 'The safety of the radioactive waste facility should be ensured for its lifetime, including the operational period'.

The Draft EIS undertook extensive safety and risk analysis to ensure that the repository could be sited safely at Site 52a, with due regard to the safety of trials within the WPA and WIR. These analyses indicate that the associated risks are low and within acceptable

operational parameters, using Defence's own risk management methodologies. The studies reported in the Draft EIS support the statement on page 94.

Chances Swamp is listed as a formal landing ground. In fact, the airstrip has been deregistered due to liability issues.

This is noted and recorded in the Errata (Appendix C).

10.5 Planning Policy

No comments were received on this topic.

10.6 Future Activity Assessment

The Draft EIS has not taken into account the developing kangaroo harvesting activity in the region. Commercial kangaroo harvesting for human consumption occurs on or immediately adjacent to all three sites but is not mentioned as a land use activity (in Section 10.6).

The project area does fall within the Kingoonya Kangaroo Management Region of the South Australian (Department for Environment and Heritage 2002) in which red kangaroo, western grey kangaroo and euro are commercially harvested.

As noted in Section 12.1 of this document, the 1.5 x 1.5 km buffer zone around the repository would have an animal-proof fence to exclude grazing animals including kangaroo, sheep, cattle and emus (see Section 6.1.5 and Figures 6.1 and 6.2 of the Draft EIS). Thus kangaroos would not be able to access the surface of the repository or its buffer zone.

The potential pathway of radionuclides from the repository to kangaroos is similar to that for pastoral species. It would require passing through the containment barriers of the repository, release into soil, uptake by plants and consumption by kangaroos, a long and complex pathway. Kangaroos are more mobile than pastoral animals and are very unlikely to obtain a significant part of their annual intake of vegetation from the vegetated surface near to the repository.

The Draft EIS fails to take into account evidence gained from international experience of the negative socio-economic impact upon communities that host radioactive waste facilities.

The potential socio-economic impacts of the repository on the communities in the region are discussed in Sections 10.6 and 10.7 of the Draft EIS. The existing land use and demographics are discussed in Section 10.4.

10.7 Evaluation of Impacts and Risks

The proposal will tarnish South Australia's clean green image and impact on the agriculture, food and wine, and tourism industries.

We call upon the proponent to establish a mechanism for monitoring the values of land and commodities adjacent to the proposed repository and to fully compensate any landholders or industries that may experience financial losses as a result of the repository.

The repository does nothing for Australia's image abroad and contravenes the wishes of the majority of Australians who want a clean and green future.

As the nation's leading wine exporter, and one of the major grain exporting states, and with many other important food production industries, the title of the nation's radioactive waste dump is simply an economic disaster waiting to happen. It quite likely that South Australia's entire food export production will be degraded.

Tourism will be affected.

South Australia regards tourism as one of its most important growth industries, particularly eco-tourism and it is precisely this sector of the tourism market that will be most heavily impacted by the establishment of the site.

The economic cost will be very significant and more importantly, the cost will increase and continue with every passing year.

The South Australian Environment Minister indicated to the SA State Parliament on 14 August 2002 that radioactive waste is currently stored around South Australia at more than 130 sites in over 26 suburbs and towns, often in places that were not designed for the long-term management of radioactive waste.

These current arrangements, which are less than ideal, have not damaged South Australia's 'clean, green image', nor deterred tourists or economic development. The disposal of waste in a central, managed national repository would further reduce any risk to the environment and people.

Transport and disposal of waste will be safe and appropriately regulated to ensure that there is minimal impact at the 100 x 100 m site and no environmental impact beyond the 1.5 x 1.5 km buffer zone.

Foodstuffs can be checked on request and certified as safe through a well-established surveillance program operated by ARPANSA.

Many of Australia's trading partners, including Japan, the US, UK and other European nations, have radioactive waste management facilities located in areas of agricultural production or tourist interest. For example, a repository 100 times larger that the proposed national repository has been built in the Champagne region of France. There is no suggestion that tourists are deterred or that wine from the Champagne region is not considered to be 'clean and green' even though the grapes are grown near a repository.

In addition, radioactive materials (e.g. americium/beryllium) are used in agricultural moisture meters. Therefore the production of 'clean, green products' benefits from the use of radioactive materials, and the responsible management of the resulting waste should assist in their continued production.

Hay Shire Council believes that the transportation of the waste through what is a highly productive agricultural area has the potential to harm the reputation of the area.

The Commonwealth should commit to ongoing dialogue with pastoralists in the region to monitor any adverse impact on their ability to sell stock or on the price of their stock as a result of the location of the repository and if necessary, agree to fund programs to address negative perceptions of the region caused by location of the repository.

Consultation with local land users will continue after repository operations have begun. A local consultative committee will be established where issues such as these can be discussed. There is no monitoring of potential adverse impacts on the ability to sell stock, nor on the price of stock, arising from the existing uranium mining operations at Olympic Dam. These operations have far greater potential for release of radionuclides into the environment than the proposed repository.

The proximity to the local missile testing range is of concern / unacceptable.

We do not question the need for the repository; however we are concerned about the preferred location of Site 52a being within the WIR.

A risk assessment has been made of the impact of military activity on the repository if it were located within the WIR. This is discussed in Section 10.7.5 of the Draft EIS, which concluded that the operations at the WIR could be conducted at low risk, provided that that planning and management of operations takes into account the presence of the repository.

There is a risk of test missiles striking the repository.

The Draft EIS identifies 'operational hazards' associated with missiles / rockets but dismisses them with the assertion that 'Appropriate procedures would be developed to address these issues'.

Some radioactive waste is already stored at two sites relatively close to Site 52a. Siting the repository outside the WPA, for example at Sites 40a or 45a or at greater distance, would provide an opportunity to rectify this hazardous situation.

We are concerned about the flaws in the Draft EIS risk analysis including the incorrect evaluation of the probability of an impact affecting the repository.

The risk of the repository being hit by a missile has been calculated using US Department of Defense methodology (see Section 10.7 of the Draft EIS). The mishap probability is 'remote', the mishap severity is 'marginal', and the risk category is 'medium' which is the second lowest risk category presented by the relevant standard. Risk mitigation measures would statistically reduce the risk to a risk category of 'low'.

Short and long-lived intermediate level waste belonging to the Department of Defence was moved to the WPA in 1995, and the waste has been stored since then in an above-ground structure at Launch Area 5, some 3 km from Site 52a. Since the time of the transfer, Defence's operational activities have been able to take account of the structure and location in which the waste is stored.

The preferred site is only 3 km from the Range E target where an active program is in progress, which the Draft EIS also admits is a risk. Members of the US Defense Department have privately expressed concern stating that an average of 60 weapons per year could strike the repository.

The risk analysis evaluation of the kinetic energy required to penetrate the soil covering the repository, and of the consequences of an impact on the repository, is incorrect.

Section 10.7.5 of the Draft EIS (p 240–41) states that smaller, low velocity projectiles can be expected to fragment on impact with only ground penetration and are likely to damage only surface features or structures, and that only large weapons in excess of 250 kg impact mass would have sufficient impact energy to penetrate the soil covering the repository to a depth of 5 m. These comments are not justified. In particular, ASRI has observed the penetration of spent rockets weighing only 38 kg and 43 kg to a depth approximately 3 m into the ground (photo supplied). The ground at Woomera is generally a thin layer (approximately 0.3 m) of stony soil with dense clay underneath. The loose, bulldozed earth covering the repository is likely to offer far less resistance than the undisturbed ground. Thus it is entirely possible, based on the observations of ASRI that even small bombs and rockets could penetrate the repository. ASRI believes that the repository is therefore incompatible with most trial activities in that area.

A very conservative risk assessment was presented in Section 10.7 of the Draft EIS. The Australian Department of Defence advised that there were on average 60 weapons firings

per year that could potentially strike the repository. Defence advise that of the 60 weapon releases, 42 have the potential to penetrate to a depth of 5 m.

The repository cover would not be loose bulldozed earth. Soil fill over the repository contents would be compacted and covered with a compacted clay and other layers. Some further soil consolidation may be expected to occur. In addition any radioactive sources determined to be of higher activity would be contained in the repository within a conditioned concrete matrix.

A comparison with the relevant standards is not made, for example the Flight Safety Code issued by the Space Licensing and Safety Office (SLASO) permits only a 10^{-7} probability of impact per space launch on nominated high-value or sensitive assets and there is no guarantee that the repository would not be declared such an asset in the future.

No information was sighted during the preparation of the Draft EIS to indicate that Site 52a lies within the safety templates of proposed space launches or that the probability of impact per launch exceeds 10^{-7}. The risk assessment described in Section 10.7.5 of the Draft EIS indicates that the risks associated with Defence weapons trials (which are much more common in the WPA than space launches) lie within acceptable risk parameters, based on military risk standards.

The establishment of the repository at Site 52a will expose the repository to dangerous hazards that do not exist at Sites 40a and 45a.

A detailed risk assessment associated with the use by the Department of Defence of the WPA is outlined in Section 10.7 of the Draft EIS. The risk assessment indicated that, with no mitigating measures, the risk category is the second lowest presented by the relevant standard. Risk mitigation measures would potentially reduce the risk category to low.

The Draft EIS bases the conclusion about compatible activity in part on the current storage of radioactive waste in the WIR; however this temporary storage arrangement has had a detrimental effect on the use of the WIR area.

The analysis of compatibility undertaken in the Draft EIS is not based on the fact that radioactive waste is already stored there. Investigations undertaken for the Draft EIS, including extensive consultation with the Department of Defence, were unable to identify any case where trials or activities did not go ahead because of the presence of radioactive waste. The WIR has continued to function with two radioactive waste stores located on it.

The Draft EIS does not adequately address compatibility with the primary use of the WIR/WPA, namely ongoing and expanding weapons testing and commercial trials. There is particular concern that Site 52a is located well within the designated hazardous areas for most weapons trials including those in Range E and the adjacent Range E target area. The real possibility of a catastrophic event at Site 52a was demonstrated recently when a NEXST-1 launch resulted in the explosive impact of the burning rocket booster 15 minutes after launch.

The Draft EIS does address compatibility with the primary use of the WPA, as the risk assessment was undertaken using Defence data on the type and number of weapons trials/launches that have the potential to impact on Site 52a. Defence safety template data were also used and the analysis was undertaken on the basis that the repository lay within the nominated Defence template.

The failure and crash of the NEXST-1 launch vehicle occurred within 500 m of the launch point and not within the landing area template shown in the attachment to the submission. This was some 8 km from Site 52a. It is also understood that, although visually spectacular, the impact of the launch vehicle resulted in little if any cratering and would not have been sufficient to breach 5 m of cover. While the launch vehicle was destroyed, the trial vehicle was recovered largely intact.

Chapter 10 of the Draft EIS Main Report presents calculations, concerning the likelihood of an accidental missile/bomb impact, that are seriously flawed and significantly undermine conclusions drawn concerning the risks associated with Site 52a. The calculations should be based on safety template areas, rather than the ratio of the repository area to the area of the entire WPA.

The calculation (which is not described in the Draft EIS) of the probability of impact on the proposed repository were it to be located at Site 52a, is incorrect. The calculation apparently fails to take account of the area of the target (a 10,000 m^2 repository is much more likely to be hit than a 1 m^2 object).

The submission appears to have misunderstood the nature of the risk calculations discussed in Section 10.7.5. The method of calculating the probability of a weapon impacting on the repository is based on the safety template areas and uses Defence's own advice regarding the varying probability of impact within the safety template. The safety templates used by Defence are based on the probability of impact from an individual weapon release of 1×10^{-6} at the template boundary, increasing to approach unity at the target point.

The information provided by Defence indicates that the repository lies towards the template boundary i.e. in an area where the risk is 1×10^{-6}. The methodology using the total area of the WPA is an alternative method used to demonstrate that other methods of calculating probability of impact produce a less conservative probability of impact than the use of the template probabilities.

The calculation does not consider the total risk from all activities over the 250 year lifetime of the repository. Based on the stated (p 241) impact probability of 4.2×10^{-5} per annum, the impact probability over the 250 year life time is therefore 1.025×10^{-2}. Thus the Draft EIS should have concluded that the mishap probability level (Table 10.1, p 242) over the lifetime of the repository would not be level D Remote but level B Probable and should consequently have evaluated the risk category (Table 10.4, p 243) as Serious. This surely indicates that Site 52a should not be the preferred location.

An annual impact probability of 4.2×10^{-5} means that an impact can be expected to occur once every 23,809 years, a period 95 times the lifetime of the repository. This can reasonably be considered a Remote possibility.

Multiplying the annual impact probability by 250 means that there is a probability of impact of 1.05×10^{-2} per 250 year period, which still equates to an expected occurrence of once every 23,809 years.

The alternative method of determining the probability of impact mentioned in Section 10.7.5 and used in Section 12.5, based on the relative areas of the WPA and the repository, is also flawed. This method assumes that there is an equal probability of impact over the entire WPA; however Site 52a is located relatively close to the rangehead, the launcher areas and is only 3 km from the Range E target. The probability of impact at Site 52a will therefore be much higher than in most areas of the WPA for almost all trials.

The Draft EIS does not base its estimate of probability on the relative areas of the repository and the WPA. It presents this methodology in Section 10.7 only as an alternative demonstration. The methodology used in the Draft EIS to calculate probability of impact uses the fundamental principal inherent in the concept of safety templates.

The weapons being trialled on the WPA are intended to deliver a payload accurately and consistently at a defined target point. However, to account for weapon fault or error during trials, a safety template is applied. The size and shape of the safety template is based on the criterion that the probability of the weapon falling outside the template is to be no greater that 1×10^{-6}.

The probability of the weapon striking a chosen point within the template is therefore not uniform across the template. The probability of impact is close to 1 at the target (i.e. the template centre) and decreases with distance from the target, approaching 1×10^{-6} at the template boundary.

The assessment of the consequences of a mishap on the repository (Section 10.7.5) as either Negligible or Marginal is inappropriate. The great perception of risk from radioactive material will ensure significant costs of remediation and considerable adverse publicity and political consequences.

In the most unlikely event of there being an impact on the repository, the radioactive material would very probably be contained within the buffer zone of the facility. The clean-up would be straightforward, and undertaken with appropriate precautions and procedures. The general public is prohibited from entering the WPA (as well as the repository site) and would not be at any risk from such an event.

Placing the repository at this location will also increase liability concerns and will lead to increased insurance premiums for clients, rejection of trials and the forcing of non-optimum flight paths, which will seriously affect the competitive advantages offered by the WPA.

No evidence was sighted during the preparation of the Draft EIS to suggest that these assertions are correct.

The Department of Defence operational activities in the WIR since 1994, including the use of the range by clients, has been undertaken with the storage of radioactive waste at two locations on the range. The burial of radioactive waste below-ground will provide greater protection than storage of material above-ground in non-purpose built facilities.

It is unlikely that all clients who undertake work on the WPA will do so in the vicinity of Site 52a.

Locating the repository in the WIR is at complete variance with the statement on p 61 of the Draft EIS 'the establishment of a national radioactive waste repository, including sources, is managed in the safest, most appropriate manner possible' and the statement on p 64 'The safety of the radioactive waste facility should be assured for its lifetime, including the operational period'.

The advantages and disadvantages of the three sites are summarised in Table 14.12 of the Draft EIS. The security provided by the WPA provides additional safety for the national repository, and helps isolate of the waste from the general public.

Chapter 11

Cultural Heritage

The word Aboriginal appears twice while European heritage is a spurious part looked at in greater detail.

There is extensive reference to Aboriginal interests and concerns throughout the Draft EIS. For example large sections of Chapter 11 deal with Aboriginal issues, including a discussion of the risks the repository may pose to Aboriginal heritage and community aspirations, and impacts the repository may have on Aboriginal use of the land and resources. The length of the section dealing with European heritage (Section 11.2) is much shorter than that devoted to Aboriginal heritage.

11.1 Aboriginal Community Consultation and Views

Traditional owners of the region are opposed to the project on their land.

Once again the Federal Government has shamefully disregarded and excluded the opinions of the land's original and traditional owners.

The law should not be used to manipulate Aboriginal people into a position in which they cannot resist damage to their country.

Recently the Australian Council of Trade Unions Indigenous Conference passed a motion supporting the Kupa Piti Kunga Tjuta in their campaign to stop the repository and called on the ACTU to mount a coordinated campaign with all their affiliates to oppose the development.

The use of the Land Acquisition Act would annul native title rights in the area with subsequent cultural, socio-economic and disempowerment impacts on claimants and traditional owners. These issues have not been properly addressed in the Draft EIS.

There has been extensive consultation with Aboriginal groups with heritage interests in the Woomera area and with native title claims covering the three possible sites (see Chapter 11 of the Draft EIS). Opinions were sought both in meetings and via written submissions from Aboriginal groups.

As in the broader community, attitudes towards the project varied between and within Aboriginal groups. Opinions ranged from opposition to the proposal to guarded neutrality conditional on cultural heritage issues being assessed appropriately, and landscapes and places of spiritual and cultural significance being properly protected.

A number of Aboriginal groups undertook heritage clearance inspection of possible sites. The preferred sites and the two alternative sites and the access routes to them have been cleared for all works associated with the construction and operation of the repository (see Section 11.1 of the Draft EIS).

Aboriginal groups with native title claims covering the three sites continue to be consulted to address land tenure issues in the context of intended acquisition of the final site by the Commonwealth.

The concerns of the traditional owners, the Kupa Piti Kungka Tjuta, were not addressed in the Draft EIS, demonstrating a clear disregard for Aboriginal community concerns.

There was extensive consultation with Aboriginal groups, including the Kupti Piti Kingka Tjuta Aboriginal Corporation, before and during the siting investigations in central–north South Australia (see Chapter 11 of the Draft EIS). Issues raised by this group and other Aboriginal groups were responded to at meetings or in writing. Many of the issues raised, including the possible effect of the repository on groundwater or on plants and animals, have been addressed in the Draft EIS.

The issue of human rights and previous impacts on indigenous peoples associated with atomic testing has been raised as a concern.

Secure disposal of radioactive waste in a national repository is in no way analogous to the atomic testing that occurred at Maralinga and Emu in South Australia. The issue of human rights and previous impacts on indigenous peoples from atomic testing is beyond the scope of the EIS.

The site selection process placed Aboriginal representatives in a compromised position, with no involvement and therefore no voice or participation in the process.

It is felt that there is disrespect for the cultural knowledge of Aboriginal representatives.

The Draft EIS does not demonstrate sensitivity to Indigenous people.

If the project proceeds it will indeed be another example of how the culture of the Aboriginal people, their spirituality and their basic human rights are being trampled and disregarded by the alleged dominant culture.

If Aboriginal groups do get involved in clearances they face the possibility that the Government will point to that involvement as an indication of consent for the project. If they refuse to participate, who will protect Aboriginal heritage, dreaming and sacred sites?

Aboriginal groups have not been consulted in any meaningful or respectful way that gives them a role in decision making on the burial or transportation of radioactive waste through their communities and traditional lands.

As described in Section 11.1 of the Draft EIS, there has been extensive consultation with Aboriginal groups during the siting process for the national repository. Aboriginal groups participated in heritage clearance investigations of sites for the project. As a result of these clearances, some sites were removed from consideration for further work.

Analysis of Aboriginal heritage issues associated with the three potential repository sites is provided in Section 11.1 of the Draft EIS. It acknowledges the Aboriginal people's spiritual connections to the land, and refers to existing archaeological evidence of occupation and resource use in both the broad and localised areas.

Relevant Aboriginal groups were involved in clearing heritage assessment surveys. Examination of the three potential repository sites by both Aboriginal and European heritage experts reveals that there are no archaeological constraints to the siting of the repository.

There is no disrespect for the cultural knowledge of Aboriginal representatives; all consultation has been in good faith with respect for the cultural knowledge of the Aboriginal representatives.

Measures would be taken to ensure that the sites of cultural significance identified during the EIS and heritage clearance processes are not affected by the construction and operation of the repository.

While the site selection process for the waste repository did engage with traditional owners, many of the Aboriginal elders who took part were dissatisfied and upset with the way in which this 'consultation' was carried out.

With respect to Aboriginal and other heritage issues, will full information and consultation be made available to Aboriginal and other communities?

The Commonwealth made every effort to engage Aboriginal groups on consultation on the national repository, over a period of several years. Consultation with Aboriginal people on cultural and heritage matters is taken in confidence. Chapter 11 of the Draft EIS outlines the extensive consultation process.

There is a concern that the Aboriginal cultural clearances (Summary p 25) have been presented as Aboriginal approval of the repository but nothing could be further from the truth. The senior members of the Aboriginal groups involved in 'cultural clearance' only participated in such clearances to preserve important cultural sites for which they have responsibility.

The Summary is full of inaccuracies. No Aboriginal group in Port Augusta approved the radioactive waste dump. I was coordinator of a group opposing it. Our group never made a statement attributed to in the Summary. Please explain such misleading comments. Your conclusions re attitudes is grossly misleading. Most Pt Augusta people and northern people (including Broken Hill) strongly opposed the dump.

The Aboriginal heritage clearance process is described in Section 11.1.3 of the Draft EIS. Nowhere in that section or elsewhere in Chapter 11 is it stated or implied that involvement by Aboriginal groups in the cultural heritage clearance surveys represented Aboriginal approval of the repository. As stated above, the Draft EIS acknowledges that, as in the broader community, attitudes towards the project varied between and within Aboriginal groups.

Opinions of those consulted ranged from opposition to the proposal to guarded neutrality. The principal concerns of the groups consulted have been that cultural heritage issues were assessed appropriately and landscapes and places of spiritual and cultural significance were properly protected.

The carrying out of this serious cultural duty (cultural clearance) did not condone such use of traditional land. Most senior members have been at the forefront of a national campaign to oppose the use of this land as a nuclear waste dump.

Aboriginal groups have only ever given site clearances, which do not in any way constitute support for the project.

Section 11.1 of the Draft EIS notes that some Aboriginal groups opposed the project. It also notes that there was a range in views both within and between groups about the project.

There is a virtual absence of analysis of Aboriginal sites compared to the spurious detailed and geographical information about European Heritage. These values are wrongly weighted.

The clearance surveys concentrated on sites, places and areas of cultural, social or spiritual significance to the Aboriginal groups, and archaeological materials and sites were generally treated more peripherally. It was specific requirement of the heritage clearance agreements (HCAs) negotiated with the Aboriginal groups that there would be no disclosure to DEST or in the Draft EIS of specific information concerning areas that were of cultural, social or spiritual significance.

The various work area clearance reports, especially those from the Andamooka Land Council Association, contained information about archaeological materials and sites at the repository sites and along access routes. The requirements of the HCAs precluded disclosure in the Draft EIS of specific archaeological information presented in the reports.

Further information was gained from the geomorphological assessment of the terrain of the three repository sites and their access routes (Section 8.2 of the Draft EIS). Collectively this information showed that apart from several quartzite knapping floors at Site 52a and some archaeological material associated with creeks along parts of the Site 40a access route, the areas of gibber plains that potentially might be impacted have background scatters of stone artefacts at very low densities of less than 1 artefact/1000–10000 m^2.

Section 11.1.3 of the Draft EIS presents a brief overview of the abundant archaeological evidence from the Woomera region and its landform associations.

11.2 European Heritage

No comments were received on this topic.

Chapter 12

Radiation

12.1 Existing Environment

Kangaroo samples were not analysed for radionuclides (Section 12.1.4, Biota Survey) although they represent a potential pathway for human exposure. Kangaroo and sheep carcasses from the vicinity of the proposed repository should be sampled for radionuclides before construction and on an annual basis to demonstrate that the repository does not represent a risk to either consumers' health or the viability of pastoral activities and kangaroo harvesting.

When analysing the potential for radionuclides to reach humans in a food chain, it is normal practice to look at the constituent links in the food chain and to choose a link that provides an indication of the origin and quantity of radionuclides entering the chain or moving along it. This 'pathway' analysis provides a means of monitoring the whole chain.

The potential pathway from the repository to kangaroos is long and complex (similar to that for pastoral species), and would require passing through the containment barriers of the repository, release into soil, uptake by plants and consumption by kangaroos. Kangaroos are more mobile than pastoral animals and are very unlikely to obtain a significant part of their annual intake of vegetation from the vegetated surface near to the repository.

Direct measurement of the background level of radionuclides in kangaroos in the area would, at best, provide a small statistical sample with large error bars. Any future 'signal' i.e. elevated radionuclide concentration would be extremely difficult to detect against this baseline.

It should be noted that the 1.5 x 1.5 km buffer zone would have an animal-proof fence to exclude grazing animals (including kangaroos, sheep, cattle and emus), and key feral animal species (rabbits, cats and foxes) would be eradicated within the buffer zone (see Section 6.1.5 and Figure 6.2 of the Draft EIS). The central 100 x 100 m repository area would have a similar fence. Thus grazing animals, key feral species and larger native fauna would not be able to access the surface of the repository or its buffer zone.

Meat ants are assayed for radionuclides and are suggested as useful target organisms for future annual monitoring (see Section 12.1.4 of the Draft EIS, Biota Survey and Table 13.4). An explanation of why meat ants were selected for radionuclide assay, a comparison with published results for other regions, and the rationale for proposing to target them for future monitoring would be desirable.

Meat ants were selected for analysis because they occur in relatively large colonies at all three sites and represent a link in the food chain that may be directly related to the radionuclides in the repository. Meat ants move through the surface layers of soil in response to temperature and moisture, and can penetrate to significant depths.

If radionuclides were to be released from their packaging materials and enter the surrounding soil, meat ants would present a vector that would reliably indicate release. Unlike kangaroos, meat ants are confined to a 'nest site' and the area around this site in which they forage, they are of no commercial value and can be collected cost-effectively.

Any radionuclides that managed to migrate through the length of the food chain to kangaroos, which are close to the top of the food chain, would be highly diluted. In comparison meat ants are at the beginning of the food chain, and any radionuclides released would be relatively undiluted.

12.2 Radiation Pathway Analysis

The Draft EIS frequently uses the term 'acceptable risk' and this is also ANSTO's favourite and most used phrase. What is 'acceptable risk'?

The risk of a health effect from an actual or potential exposure to radiation would be considered acceptable if the following conditions were met:

- the risk was low in comparison to other risks to health that a person might face in the workplace or in everyday life
- the exposure arose from a use of radioactive materials or sources that was justified and had a net benefit
- any exposure was below established dose limits and all practical efforts were made to keep it as low as reasonably achievable (ALARA).

The Draft EIS states that 'overall it has been shown that the risks which might arise in future years, when the site is no longer under institutional control, are acceptably low and are in accordance with the NHMRC 1992 Code'. The Draft EIS however fails to outline who they are acceptable to.

The discussion of risk criteria is provided in Section 12.2.2 of the Draft EIS. ARPANSA, as the repository regulator, set the risk criteria.

For the dump site an effective dose constraint of 0.1 mSv has been suggested as acceptable (p 267). It would be inappropriate to use this measure as a dose constraint for exposures that may arise from the operation of a 'greenfield' nuclear dump (particularly as exposures would probably be well below this). In the UK the basic safety objective for a greenfield nuclear plant is set at 0.02 mSv — 5 times less than the proposed dose constraint.

As stated in the Draft EIS, ARPANSA (pers. comm. to DEST, January 2002) has suggested that an effective dose constraint of 0.1 mSv/yr or a risk limit of 1×10^{-6}/yr would be the appropriate dose and risk limits for the repository.

The use of operational dose constraints for individual facilities is to ensure that the exposure of a member of the public from possible sources (excluding natural background and medical sources) will not exceed the established public dose limit of 1 mSv per year. A dose constraint of 0.1 mSv/year, i.e. 10% of the limit, for the proposed national repository, is very conservative given that there will be few, if any, other potential sources of exposure for the public.

Dose objectives for new facilities are usually established at levels below dose constraints to provide a further degree of design safety. On the basis of current radiation risk estimates, the proposed risk limit of 1×10^{-6}/yr for potential exposures is equivalent to an annual dose of approximately 0.02 mSv for exposures with a probability of occurrence of unity.

12.3 Impacts and Risks During Construction

No comments were received on this topic.

12.4 Impacts and Risks During Operation and Surveillance

No comments were received on this topic.

12.5 Accidental Intrusion during WPA Activities

No comments were received on this topic.

12.6 Impacts and Risks of Decommissioning

No comments were received on this topic.

12.7 Impacts and Risks during Institutional Control

No comments were received on this topic.

12.8 Impacts and Risks of Post-Institutional Phase

The existence of active radioactive compounds, many of which are radiotoxic, well beyond the 200-year institutional life of the repository, indicate that adequate security measures will not be in place to ensure lack of access to these radioactive materials.

Burying radioactive waste creates added risks due to climatic conditions since signage and community awareness of the buried hazard is unlikely to last the approximately 300 years time period these wastes require for isolation.

Why contemplate the risk of long-term contamination?

The potential future radiological impacts and risks were addressed in detail in the Draft EIS, in Section 12.8 and Appendix E8. A broad range of environmental and social scenarios were considered, and release pathways into the environment and potential for human exposure were assessed. Overall it was shown that the risks that might arise in future years, when the site is no longer under institutional control, are acceptably low and are in accordance with the NHMRC 1992 Code.

The risk assessments are based on 'generic assumptions at the present time and assumptions about future arisings'. This equals uncertainty.

The Draft EIS considers a range of potential scenarios to determine potential radiation exposures and risks. These scenarios are considered in detail for the post-institutional phase (see Appendix E7 of the Draft EIS, discussion overview in Section 12.8 and summary of peak doses and risks in Table 12.2). These scenarios are based on defined and reasonable assumptions, and the exposure and risk assessment is rigorous.

12.9 Other Events

No comments were received on this topic.

12.10 Environmental Safeguards to Minimise Impacts

No comments were received on this topic.

12.11 Monitoring Programs and Procedures

No comments were received on this topic.

Chapter 13

Overview of Environmental Management and Monitoring

13.1 Preparation of the Environmental Management and Monitoring Plan

No details are provided to ensure that the repository management plan addresses 'operational details, ongoing control, maintenance, monitoring and reporting, and post closure management of the site'.

The responsibilities and obligations of the Commonwealth to indigenous and non-indigenous Australians for developing and managing this radioactive repository site and the commitment of the Commonwealth beyond a superficial supervisory period have not been explained.

There is no detailed stormwater management plan provided for the selected site.

A repository management plan, including stormwater management, would be prepared during the detailed design stage, as part of the ARPANSA licensing process (see Section 3.3 of the Draft EIS). A comprehensive outline of environmental management strategies is provided in the tables in Section 13.2. The tables cover the various stages of the project — construction, operation, surveillance, decommissioning and institutional control.

13.2 Management and Monitoring Approaches

I am concerned that the proposed dump would not be truly independently monitored and the problems swept under the carpet.

The monitoring would be overseen by ARPANSA, established under the ARPANS Act, as the Commonwealth's independent regulator, as described in Sections 3.2 and 3.3 of the Draft EIS. The outline of the proposed monitoring program is provided in Section 13.2 of the Draft EIS.

The schedule of groundwater monitoring lacks an adequate groundwater monitoring network and does not adequately define what constitutes a contamination event of uncontaminated groundwater, or an excursion of contaminated groundwater. It also does not adequately develop risk management strategies to ensure zero/minimal impacts on groundwater or contingency plans to be implemented in the event of a contamination event or excursion, nor does it explore expected effectiveness.

These matters would be addressed during the detail design stage, as part of the ARPANSA licensing process (see Section 3.3 of the Draft EIS). An EMMP would be prepared before the construction and operation of the repository, as required under the NHMRC 1992 Code. A framework of this plan is described in Section 13.2 of the Draft EIS and includes management strategies to minimise environmental risks, and proposals for groundwater monitoring.

Potential groundwater impacts have been assessed in detail using actual soil samples from the preferred and alternative sites (see Section 8.5.6 and Appendices C4 and C5 of the Draft

EIS). The results indicate concentrations of the selected radionuclides modelled would be so low at the base of the repository as to be effectively undetectable (see Table C5.4 of the Draft EIS).

Radioactive waste requires monitoring for the full period that it can harm life. If a repository is to be built at a remote site anywhere, adequate surveillance over such a time is highly unlikely.

Even in the foreseeable short-term (50 years) the Draft EIS gives little reason for the assurance re the continual monitoring of the area.

The operational life of the proposed national repository is expected to be at least 50 years during which time there will be occasional disposal operations. During the extended periods when there are no disposal operations, an active program of environmental monitoring and surveillance will be maintained to ensure the safety of the repository and security of the site. After 50 years of operation, there would be a review to consider whether the repository should continue to accept waste.

Once the facility has ceased operations there will be a further period of institutional control for 200 years. The site will continue to be monitored to check the integrity of the disposal facility and to carry out a program of environmental monitoring. Access to the site will remain restricted during this time. The various surveillance programs are outlined in Chapter 13 of the Draft EIS.

Chapter 14

Conclusions

No comments were received on this chapter.

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Appendix A

List of Respondents

Appendix B

Summaries of Responses and Index

Appendix C

Errata