

## CHAPTER NINE

### FUEL AND WASTE MANAGEMENT

#### Introduction

9.1 In Part II of the Report, the Committee examined the tendering process and the nature of the contractual commitments entered into by the Commonwealth in relation to the new research reactor project.

9.2 In this chapter, the Committee examines in detail the adequacy of the provisions of the contract which deal with the issues of fuel and waste management. These are matters for which the contractor, INVAP, bears responsibility, and include the issues of fuel type and source, spent fuel management arrangements during operation, and arrangements made to ensure that spent fuel rods can be reprocessed safely.

9.3 The Committee also considers aspects of the fuel and waste management arrangements which are not the responsibility of the contractor but which are relevant to the granting of regulatory approval for the construction and operation of the new research reactor. These include the issues of the safe storage and disposal of reprocessed spent fuel rods, and the timing of any requirement for the provision of an Australian long-term waste storage facility for rods from a new reactor.

#### The adequacy of fuel and waste management provisions in the contract

9.4 As outlined above, the issues to be considered in this connection are as follows:

- fuel type and source;
- spent fuel management arrangements during operation; and
- arrangements made to ensure that spent fuel rods can be reprocessed, including the adequacy of arrangements for international reprocessing of spent fuel rods.

#### *Fuel type and source*

9.5 ANSTO informed the Committee that:

About two decades ago, broad international agreement was reached that, for nuclear non-proliferation reasons (which Australia strongly supports), high enriched uranium (HEU) fuels would be phased out of use in research reactors and be replaced with low enriched uranium (LEU) fuels.<sup>1</sup>

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1 ANSTO, submission no. 118, p. 38.

9.6 Accordingly, ANSTO specified in its Request for Tender documentation for the new reactor that the ‘fuel elements shall be of low enrichment uranium (LEU) having a uranium content of less than 20 percent uranium-235 by weight’.<sup>2</sup>

9.7 The first generation of LEU fuels is composed of uranium and silicide, and has the disadvantage of being difficult to reprocess. ANSTO noted that reprocessing is possible in conjunction with other fuel but that, in general, spent uranium silicide fuels have been managed through long-term storage.<sup>3</sup> A new generation of LEU fuels, based on uranium and molybdenum (UMo), is currently under development. These fuels are being designed both to ‘provide better reactor performance than the uranium silicide fuels’, and ‘to be reprocessed’. They are, ANSTO states, expected to enter into service in about five years’ time.<sup>4</sup>

9.8 ANSTO left it to the tenderers to determine the particular type of LEU fuel they would use, but advised that ‘in the event, all four tenderers based their bids on uranium-molybdenum fuel’.<sup>5</sup> Given that this fuel is still under development, each tenderer was also required to indicate which fuel they would use if the UMo fuel were delayed in entering into service. Again, all four tenderers submitted that they would use uranium silicide fuel as an interim fuel type.<sup>6</sup>

#### Criticisms of proposed fuel types

9.9 Ms Jean McSorley, representative of the interests of the general public on the Nuclear Safety Committee, ARPANSA, raised two matters in connection with the proposed fuel types. First, she expressed concern at the prospect of two different fuels being used in the reactor. She wrote:

Reactors, particularly research reactors, are very specific designs. Changing fuel types, or designing a reactor to accommodate a change in fuel types, is not a normal situation. ANSTO and ARPANSA must be made to answer as to what type of problems might occur if there has to be a change in fuel type during operation and how this might impact on performance, safety criteria and costs.<sup>7</sup>

9.10 The request for tender documents show cognisance of this issue. They state:

If one of the new high density fuels currently under development is proposed as the long term fuel for the reactor, then the reactor shall be designed to optimise reactor performance for the use of that fuel to the

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2 ANSTO, submission no. 118, Attachment P.

3 *ibid*, p. 38.

4 *ibid*.

5 *ibid*.

6 *ibid*.

7 Ms Jean McSorley, submission no. 122, p. 4.

extent possible under the constraints imposed by any initial use of lower density fuel which may be required.<sup>8</sup>

9.11 Ms McSorley also questioned whether ANSTO's confidence in the timely development of the UMo fuel was justified and the consequences should it be misplaced.<sup>9</sup> In relation to this issue, the Committee notes the following statement by ARPANSA:

ARPANSA would expect that any fuel proposed for use in a replacement reactor must be 'well proven'. Existing fuel types must have operated reliably in existing reactors, with convincing and well documented performance characteristics and history. ARPANSA would give particular attention to the qualification program for any new fuel types, if such should be proposed. Qualification would need to be rigorous and thorough, at least equivalent to past practices for qualifying new fuel types, and in line with standards currently accepted by other nuclear regulatory bodies.<sup>10</sup>

9.12 Questioned on whether the UMo fuel type could be 'well proven' by the time the new reactor is due to be operational, the Director, Regulatory Branch, ARPANSA, Mr Don Macnab, elaborated:

All fuel types have been new fuel at some stage. So all fuel types have gone through a process of qualification. We would expect to see a process of qualification of any new fuel type equivalent to those of the past that have been well proven and have shown to be good fuels in operation ...

**Chair** – Are you able to give us a time? If the fuel is not going to be available until 2003-04 and then there has to be a period after which it will end up meeting the criteria of well proven, what are we talking about in time here?

**Mr Macnab** – The process of qualifying new fuel types is going on at the moment. It is a possibility that sufficient work will have been done to demonstrate the viability of the fuel by the time the replacement reactor is due to go into operation. If that should not be the case and we require further proof of that, we would expect that it could be achieved within a couple of years of the start up of the reactor. There is a significant time between now and then.<sup>11</sup>

9.13 ANSTO advised further that it is only the composition of the fuel 'meat' that is new in the uranium-molybdenum fuel. The design of the fuel 'rod' itself will be the

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8 ANSTO, submission no. 118, Attachment P.

9 Ms Jean McSorley, submission no. 122, p. 4 and submission no. 122A, p. 6.

10 ARPANSA, submission no. 144, p. 6.

11 *Committee Hansard*, 26 October 2000, pp. 243-244.

standard aluminium clad, plate type dispersion fuel that has been the most commonly used fuel rod design in research reactors world-wide.<sup>12</sup>

#### Fuel source

9.14 According to ANSTO the contract requires that INVAP supply fuel assemblies for the first full core load and for a second full core.<sup>13</sup> After these first two cores, fuel for the reactor will be supplied by commercial contract, as is the fuel for HIFAR. ANSTO said that a decision about the source of that fuel will be made on a commercial basis closer to the date of commissioning the reactor, but that possible suppliers include INVAP (Argentina), CERCA (France) and BWX Technologies (United States).<sup>14</sup>

#### *Spent fuel management arrangements during operation*

9.15 ANSTO informed the Committee that the new reactor is to be designed so that spent fuel discharged from the reactor core will be moved under water into storage racks in the reactor service pool. This pool will be next to the pool holding the reactor core, and will be connected to it.<sup>15</sup> ANSTO stated that the storage racks ‘will have the capacity to store, under water, up to 320 elements while their radioactivity decays pending arrangements for overseas shipment and reprocessing’.<sup>16</sup> The advantages of this arrangement, according to ANSTO, are that it minimises the handling of spent fuel and ensures that the spent fuel is protected by the same structural features as the reactor itself.

9.16 After a period in storage, the spent fuel will be transported overseas for reprocessing. ANSTO advised that the timing of the spent fuel shipments depends upon various factors, including:

- the time required to accumulate a practicable sized shipment;
- the minimum cooling time required for the youngest elements in the shipment, to satisfy shipping cask regulatory criteria; and
- the benefit for radiological safety for minimising the number of such shipment operations.<sup>17</sup>

9.17 The Committee notes that the safety implications of this ‘inter-linked store for spent fuel elements’ must be assessed in detail and to the satisfaction of ARPANSA in

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12 ANSTO, submission no. 118, p. 38.

13 *ibid*, p. 38 and Attachment P.

14 *ibid*, p. 38.

15 *ibid*, p. 39.

16 *ibid*.

17 *ibid*.

the Preliminary Safety Analysis Report (PSAR), which is to be prepared by INVAP at the detailed design stage.<sup>18</sup>

*Arrangements for safe reprocessing, storage and disposal of spent fuel*

9.18 Since October 1995, it has been Australian government policy that spent fuel arising from research reactor operations be reprocessed overseas with the resulting long-lived intermediate level waste returned to Australia.<sup>19</sup> ANSTO described the reprocessing procedure in the following terms:

The first step of reprocessing is to dissolve all the metallic fuel elements together in strong acids. The resulting solution is then chemically treated to separate the reusable uranium, after which the remaining radioactive fission products and other components are solidified with glass-making compounds to produce a stable vitrified waste form.<sup>20</sup>

It is this 'conditioned, consolidated and specially packaged waste' which is returned to Australia for storage as long-lived intermediate level waste.<sup>21</sup>

9.19 Questions were raised during the inquiry about the validity of this policy of sending spent fuel overseas for reprocessing. For example, Ms McSorley expressed concern that no consideration 'had been ... given to using a fuel type which did not need reprocessing'.<sup>22</sup> She suggested that assumptions about the inevitability of reprocessing or conditioning spent fuel legitimated both procrastination in dealing with long-lived wastes and reliance on highly uncertain overseas reprocessing arrangements.<sup>23</sup>

9.20 In assessing these concerns, the Committee turned first to the draft Environmental Impact Statement and to the technical justification for the policy. The EIS had argued that, if the new reactor fuel is clad in aluminium, as is HIFAR fuel, then it will not be possible to store it indefinitely without some form of reprocessing or conditioning. That is because, over periods greater than 30 years, the aluminium cladding begins to degrade, resulting eventually in 'the loss of the primary barrier that prevents radioactive fission products escaping from the fuel'.<sup>24</sup> The EIS stated that the

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18 ANSTO, submission no. 118, Attachment O. The requirement for the detailed assessment is Condition 17, set by the Minister for the Environment and Heritage. See Environment Australia, *Environment Assessment Report: Proposed Replacement Nuclear Research Reactor at Lucas Heights*, February 1999, p. 201.

19 ANSTO, submission no. 118, p. 43.

20 *ibid*, p. 40.

21 PPK Environment & Infrastructure Pty Ltd, *Replacement Nuclear Research Reactor: Draft Environmental Impact Statement*, Volume 1/Main Report, July 1998, p. 10-16.

22 Ms Jean McSorley, submission no. 122, p. 4.

23 *ibid*, pp. 4-6.

24 PPK Environment & Infrastructure, *Replacement Nuclear Research Reactor: Supplement to Draft Environmental Impact Statement*, Volume 1/Main Report, July 1998, p. 10-17.

established process for placing the spent fuel ‘into a more leach resistant form’ is reprocessing.

9.21 The Committee sought to establish whether there was any non-aluminium clad fuel type that could be used in the new reactor, and that therefore would not require treatment before direct disposal or indefinite storage. In response to this inquiry, ANSTO advised that, while non-aluminium clad fuels could be used in power reactors, aluminium clad fuel is the standard type of fuel used in nearly all research reactors worldwide, ‘indeed – to our knowledge, in all modern multi-purpose research reactors’.<sup>25</sup> ANSTO continued:

There are many technical reasons for this, involving issues such as neutron economy (ie. low neutron absorption) and high thermal conductivity, allowing the fuel to operate at lower temperatures and hence with higher safety margins. It also needs to be understood that the fuel design, including its cladding, are key parameters in the overall reactor design, so that it is not possible to simply put a different type of fuel into a reactor designed to use aluminium clad fuel.<sup>26</sup>

9.22 ANSTO advised the Committee that its existing contract with COGEMA for the reprocessing of spent fuel from HIFAR ‘includes provision for the reprocessing of spent fuel from the new reactor’.<sup>27</sup> The final details of this arrangement are ‘to be settled once the fuel design for the reactor is known’.<sup>28</sup>

9.23 ANSTO also stated that the contract with COGEMA also includes provision of the multi-purpose transport and storage casks for the return transport and long-term storage of the wastes. ANSTO noted that the total quantities of intermediate-level waste arising in Australia during the life of the new reactor are unlikely to justify the construction of a deep geological disposal facility, but that ‘should there be a requirement eventually for the final disposal of these wastes, the waste form and its packaging will be suitable for such disposal’.<sup>29</sup>

9.24 ANSTO’s tender specification for the new reactor also required that each bidder demonstrate that an alternative ‘viable spent fuel disposition strategy exist’ for the fuel elements and assemblies provided for use. A ‘viable’ strategy must not involve:

- (a) direct disposal of research reactor spent fuel in Australia, nor
- (b) reprocessing of spent fuel in Australia, nor

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25 ANSTO, submission no. 118A, p. 46.

26 *ibid.*

27 ANSTO, submission no. 118, p. 41.

28 ARPANSA, submission no. 144, p. 6.

29 ANSTO, submission no. 118, p. 40.

(c) indefinite storage of research reactor spent fuel in Australia.<sup>30</sup>

9.25 This requirement is in addition to ANSTO's own arrangements with COGEMA, and was designed, ANSTO said, to provide an extra level of assurance that spent fuel from the new reactor could be disposed of in conformity with Australian government policy.<sup>31</sup> ANSTO informed the Committee that the successful tenderer, INVAP, had 'given a written guarantee to provide an alternative solution consistent with Australia's requirements, as stipulated in the Request for Tender, using proven technologies'.<sup>32</sup>

9.26 INVAP's solution, explained to the Committee by Mr Hector Otheguy, General Manager and Chief Executive Officer, INVAP, would be to ship the spent fuel to Argentina where it will be conditioned into the form of long-lived intermediate level waste and returned to Australia for long term storage.<sup>33</sup>

9.27 During the inquiry, three doubts were raised about the validity of these arrangements for reprocessing spent fuel from the new reactor. They concerned:

- the status of ANSTO's arrangements with COGEMA for reprocessing silicide fuel;
- INVAP's capacity, technically speaking, to undertake appropriate conditioning or reprocessing of the spent fuel; and
- whether the Constitution of Argentina, which specifically prohibits the importation of radioactive waste to Argentina, would allow INVAP to condition the spent fuel in Argentina.

9.28 The Committee will discuss these matters in turn.

#### ANSTO's arrangements with COGEMA for reprocessing silicide fuel

9.29 One of the unsuccessful tenderers for the reactor contract, Technicatome, wrote in its submission that silicide fuel 'is not currently industrially reprocessable ... and is excluded from the current reprocessing contract with France'.<sup>34</sup> In oral evidence, representatives of the company also implied that if COGEMA were to undertake reprocessing of silicide fuel, it would do so as a consequence of its special relationship with Technicatome. Mr Jean-Luc Minguet, Project Manager, Technicatome, said:

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30 ANSTO, submission no. 118, p. 41.

31 See ANSTO, submission no. 118A, p. 48; and Professor Helen Garnett, *Committee Hansard*, 9 February 2001, p. 527.

32 ANSTO, submission no. 118, p. 41.

33 Mr Hector Otheguy, *Committee Hansard*, 26 October 2000, p. 215.

34 Technicatome, submission no. 120, p. 3.

This silicide fuel could not be formally acceptable in the tender because it was not reprocessible. But, on an experimental basis and in small quantities, we have checked with COGEMA – and it is the second subject in which we are in relation with COGEMA – that small quantities of such fuel directly derived from the technology used in France could be reprocessed and the waste sent back to Australia according to your specifications.<sup>35</sup>

9.30 ANSTO contradicted the implication of these remarks. ANSTO's Executive Director, Professor Helen Garnett, said:

The issue of silicide fuel is that it can be co-processed with other kinds of ... fuel but COGEMA prefer not to take too much of it because of their own process. However, we have agreement with COGEMA – there were claims by Technicatome that they were the only ones who could organise that but I am afraid that is not true – that they will take the volumes of silicide fuel that we reasonably expect to have to handle in the interregnum if there is a gap before we switch over to uranium molybdenum fuel.<sup>36</sup>

9.31 The Committee notes ANSTO's explanation of the arrangements with COGEMA for reprocessing silicide fuel, if required, from the initial operations of the new reactor. It notes further the advice from Dr John Loy, CEO, ARPANSA, informing the Committee that he has seen the provisions of the contract between ANSTO and COGEMA relating to these arrangements. Dr Loy said that he was satisfied that 'not only that there was an existing arrangement but that there was a commitment to at least consider that arrangement continuing, in the light of whatever fuel was adopted for the replacement reactor'.<sup>37</sup>

9.32 Dr Loy did emphasise that ANSTO's arrangements with COGEMA at this stage only commit COGEMA 'to looking at the reprocessing of the replacement reactor fuel'. That, he said, was enough for him to issue a licence to prepare the site for the new reactor, but 'clearly you have got to do better than that as you get to the next stages of the project'.<sup>38</sup>

9.33 Indeed, ARPANSA has stated that before it issues a licence to construct the reactor, 'the arrangements for the reprocessing of the specific fuel proposed for use in the reactor would need to be demonstrated to be available when the reactor would be in operation'.<sup>39</sup>

9.34 The Committee notes that the Senate passed a Return to Order motion on 6 February 2001, ordering the Minister for Industry, Science and Resources to table ANSTO's contract with COGEMA for reprocessing spent fuel. The Committee

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35 Mr Jean-Luc Minguet, *Committee Hansard*, 5 December 2000, p. 429.

36 Professor Helen Garnett, *Committee Hansard*, 9 February 2001, p. 527.

37 Dr John Loy, *Committee Hansard*, 26 October 2000, p. 242.

38 *ibid*, p. 243; see also ARPANSA, submission no. 144, p. 1161.

39 ARPANSA, submission no. 144, p. 7; Dr John Loy, *Committee Hansard*, 26 October 2000, p. 243.



further notes that, on 8 February 2001, the Senate was advised by the Minister that this contract would not be tabled, on the grounds of its commercial confidentiality.<sup>40</sup>

9.35 The Committee has also been made aware of recent legal proceedings in France where Greenpeace sought an injunction to prevent a shipment of spent fuel from Lucas Heights being unloaded and then re-processed by COGEMA.

9.36 On 15 March 2001, Greenpeace France association applied to the Tribunal de Grande Instance in Cherbourg, France, for an injunction against the unloading of a consignment of Australian spent fuel at the French Port of Cherbourg. Greenpeace argued that COGEMA did not have specific authorisation to reprocess the Australian spent nuclear fuel. The Tribunal, in summary proceedings, granted this injunction.

9.37 On 3 April, the Court of Appeal in Caen overturned this decision on the grounds that it was not within the power of a summary proceeding judge to issue such an order. It found that the Tribunal:

was not in a position to take into consideration a so called uncertainty regarding the shipment nature in as much as the terms of the agreement signed between COGEMA and ANSTO and the French authorisations refer explicitly to spent fuels and not to wastes.<sup>41</sup>

9.38 Greenpeace informed the Committee that it has filed a fresh case in the Tribunal de Grand Instance. It explained that this case will hinge on the definition of 'nuclear waste'. It argued:

...under French law, [nuclear waste] cannot be imported into France...in other words, it is illegal to store imported nuclear waste in France besides or beyond the necessary cooling periods of high level radioactive waste after reprocessing.

According to Greenpeace, 'the case will also raise the lack of specific authorisations for COGEMA to reprocess the Australian fuel and a timetable for such reprocessing'.<sup>42</sup>

9.39 Furthermore, Greenpeace submitted:

Whatever the outcomes of the extant challenge, it cannot be presumed that COGEMA will obtain the licences necessary to reprocess Australian waste, and therefore it may not be able to fulfil its obligations under its contract with ANSTO. This presents unsurpassable obstacles both legal and

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40 *Return to Order*, Documents relating to the design and construction of a replacement research reactor at Lucas Heights, Tabled by the Minister for Industry, Science & Resources on 8 February 2001 in response to the motion moved by Senator Forshaw on 6 February 2001.

41 Appeal Court of Caen, First Chamber—Civil Section, Decision of 3 April, 2001, ANSTO's translation of this judgement provided to the Committee.

42 Greenpeace Australia Pacific, supplementary submission no. 140B.

regulatory, for the project to build a new reactor at Lucas Heights, as it is clear ANSTO cannot demonstrate a viable spent fuel management strategy.<sup>43</sup>

9.40 As part of the same proceedings, the Tribunal in Cherbourg, on 15 March 2001, instructed COGEMA to provide Greenpeace France association with a certified copy of the original January 1999 agreement signed with ANSTO. The Court found that the agreement was relevant to the potential dispute between the two parties. On this matter, the Appeal Court of Caen recognised the authority of the summary proceeding judge to issue an instruction for COGEMA to provide Greenpeace France Association with a copy of the agreement and upheld the Tribunal's decision. It stated:

WHEREAS in this case the agreement signed between COGEMA and ANSTO is fully taking place within the frame of the COGEMA industrial activity regarding which it is in conflict with the GREENPEACE association: That there is indeed therefore a legitimate interest for this party in acquiring knowledge except for the financial details which are covered by commercial confidentiality.<sup>44</sup>

9.41 The Committee notes the absurdity of the situation where COGEMA, under the order of a French Court, has provided a copy of its agreement with ANSTO to Greenpeace association, yet the Commonwealth Parliament of Australia is denied access to such a document.

**9.42 Given that it has not seen ANSTO's contract with COGEMA and in view of the ongoing litigation in France, the Committee does not accept that there are adequate guaranteed arrangements in place at this stage for the future reprocessing of spent fuel from the new reactor.**

#### INVAP's technical capacity to reprocess spent fuel

9.43 Technicatome also claimed that INVAP has no facility to reprocess the spent silicide fuel from the replacement reactor, and thus that its promised alternative spent fuel disposition strategy is unsustainable. When asked to respond to this claim, Mr Otheguy said:

From the point of view of the facilities for treatment, they are right again—we do not reprocess. 'Reprocess' has a special meaning—it means to separate the uranium that is left and maybe some plutonium. We use the word 'conditioning', because we do not separate, we just take some of the fuel elements—say, the metallic part that is not highly radioactive—from the most radioactive and then have two separate treatments. One has to do with glass and the other one could be done with cement. That is what we call a conditioning process. That process is a process that we could do—

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43 Greenpeace Australia Pacific, supplementary submission no. 140B.

44 Appeal Court of Caen, First Chamber—Civil Section, Decision of 3 April; 2001, ANSTO's translation of this judgement provided to the Committee.

‘we’ in general terms means the Atomic Energy Commission of Argentina—in Argentina. Not us—again, they are right: INVAP has no facilities, we do not operate these facilities. But in Argentina the Atomic Energy Commission has those facilities and they also need this process for their own spent fuels and other kinds of radioactive waste that they have to process.<sup>45</sup>

9.44 In later evidence to the Committee, the Ambassador of the Argentine Republic, His Excellency Mr Nestor Stancanelli, confirmed that the National Commission for Atomic Energy in Argentina (CNEA) would undertake the conditioning of the spent fuel on INVAP’s behalf. He said:

CNEA in such a case is a subcontractor for this part of the contract regarding the conditioning of the spent fuel. It is a subcontractor of INVAP for this purpose.<sup>46</sup>

#### Alleged constitutional impediments

9.45 Professor Raul Montenegro, president of an Argentinian environmental organisation, FUNAM, alleged that the provisions in the contract between INVAP and ANSTO pertaining to the conditioning of spent fuel in Argentina violate Argentina’s constitution.<sup>47</sup> He thus claimed that the contract was, in this regard, invalid.

9.46 Article 41 of the Argentine Constitution states, according to Professor Montenegro’s translation, that:

The entering to the national territory [Argentina] of waste currently or potentially hazardous, and of those radioactive, is prohibited.<sup>48</sup>

9.47 Professor Montenegro argued that spent fuel is radioactive waste, and hence that the ‘transfer of spent fuel from Australia to Argentina, whose provision is contained in the contract, cannot proceed. It’s prohibited and thus illegal’.<sup>49</sup>

9.48 The Committee sought advice from the Ambassador of Argentina as to the validity of Professor Montenegro’s argument. The Ambassador stated that the body in Argentina with responsibility for ruling on these matters is the Nuclear Regulatory

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45 Mr Hector Otheguy, *Committee Hansard*, 26 October 2000, pp. 216-217.

46 Ambassador Stancanelli, *Committee Hansard*, 6 November 2000, p. 383.

47 The organisation is the Environment Defence Foundation, or FUNAM (Fundación para la defensa del ambiente) in Spanish.

48 Professor Raul Montenegro, submission no. 161, p. 19.

49 *ibid*, submission no. 161, p. 20. Professor Montenegro’s argument has been repeated by a number of groups in Australia, including the Australian Conservation Foundation. See, Mr David Noonan, *Committee Hansard*, 2 February 2001, p. 497.

Authority (ARN).<sup>50</sup> He tabled a statement made by that authority which responded to Professor Montenegro's claims.<sup>51</sup>

9.49 The ARN stated that INVAP had asked it whether the entry into Argentina of spent fuel elements from the new reactor, in order that they be conditioned prior to final disposal in Australia, would be permitted. The ARN had replied that it was of the view that importing radioactive materials in the shape of spent fuel elements for conditioning and eventual repatriation would be allowed under the laws of Argentina.

9.50 The basis of this view, ARN said, is that Argentina's Law 25279, which ratifies the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, 'makes a clear distinction between radioactive fuel and used fuel elements'. The statement continues:

In fact, used fuel elements are not considered radioactive waste even after they have been used (irradiated) or if they are at the end of their useful life (spent), within the reactor, due to the fact that they are liable to further processing. In this regard, it must be emphasized that the Joint Convention is the result of debate amongst technical and legal experts from a number of countries and reflects the consensus these experts reached on this matter. Because the possible entry into the country of spent fuel elements from Australia and their later repatriation would be through international transferrals, the ARN considers that the matter can reasonably be encompassed within the frame of the Convention mentioned—which was signed by both Argentina and Australia.<sup>52</sup>

9.51 The Committee asked the Ambassador whether the opinion of the Nuclear Regulatory Authority on this matter could be subject to challenge in the Argentine courts. The Ambassador replied that, although the ARN is the body with authority to make such a determination, individuals, 'because we are free countries and we have separation of powers—can seek justice if they consider that a decision is not according to the law'.<sup>53</sup> He also noted that Argentina has not previously imported spent fuel for conditioning and subsequent repatriation.<sup>54</sup>

9.52 The Committee notes, then, that it is possible that a legal challenge to the validity of the ARN's ruling could be raised in the Argentine courts. It also notes, however, that since the ARN is the highest regulatory authority on nuclear issues in Argentina, neither INVAP nor ANSTO could have sought, at this stage, any greater assurance as to the validity of their contractual arrangements than they have been given.

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50 Ambassador Stancanelli, *Committee Hansard*, 6 November 2000, p. 370.

51 Embassy of the Argentine Republic, *Additional Information*, 23 November 2000, Annex I.

52 *ibid.*

53 Ambassador Stancanelli, *Committee Hansard*, 6 November 2000, p. 371.

54 *ibid.*, p. 384.

9.53 Ms Jean McSorley raised a further challenge in relation to this matter. She argued that the distinction between spent fuel and radioactive waste holds only if the spent fuel is to be reprocessed, such that unused uranium and/or plutonium is separated out for reuse. She argued that spent fuel destined for conditioning, rather than reprocessing, is not destined for reuse and thus must be considered as waste.<sup>55</sup> She supported her contention with reference to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste, which defines radioactive waste as material ‘for which no further use is foreseen by the Contracting Party...and which is controlled as radioactive waste by a regulatory body under the legislative and regulatory framework of the Contracting Party’.<sup>56</sup>

9.54 Given this definition, she suggested, making a distinction between spent fuel and radioactive waste does not overcome the problems associated with importing spent fuel from Australia’s new reactor into Argentina. That is because, insofar as INVAP proposes to condition and not to reprocess that fuel, it must already be deemed as waste.

9.55 In response to this kind of argument, Professor Garnett suggested that the crux of the distinction between spent fuel and radioactive waste is based not on the *actual* future use to which it is put, but on its *potential* for future use. She said:

... material is spent fuel so long as it is in the form of spent fuel, and as long as it contains uranium, et cetera, in there it is spent fuel ... It is after the chemical dissolution process that it then becomes waste ... it is spent fuel so long as it is in the form of spent fuel and has reusable uranium in it.<sup>57</sup>

9.56 Whilst there may be differences in the technical definitions of what constitutes spent fuel and what is waste the Committee finds that such distinctions are somewhat artificial. The fact is that the spent fuel rods from Lucas Heights have, for many years, been regarded as waste. Until recently, the rods have simply been stored on site as there was no further use for them and there was no known method of disposal. Indeed the McKinnon Review stated that ‘the spent fuel rods at Lucas Heights can only sensibly be treated as high level waste’.<sup>58</sup>

9.57 Even though the spent fuel rods are now shipped overseas they will eventually return to Australia as waste which contains similar amounts of radioactivity and which everyone acknowledges must be ultimately stored in a safe manner and at an appropriate location.

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55 Ms Jean McSorley, submission no. 122D, p. 2.

56 Article 2: Definitions, <http://www.iaea.org/worldatom/Documents/Legal/jointconv.shtml> (31 October 2000).

57 Professor Helen Garnett, *Committee Hansard*, 9 February 2001, p. 549.

58 K. R. McKinnon et al., *Future Reaction: Report of the Research Reactor Review*, August 1993, p. xxiii.

9.58 The Committee also notes that the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management is of relatively recent origin,<sup>59</sup> and that it seems more concerned with the decision of a controlling party about how to ‘deem’ spent fuel than the nature of the radioactive hazard posed by the material itself.

### **Fuel and waste management provisions outside the contract**

9.59 As indicated at the beginning of the chapter, there are issues relating to spent fuel and waste management that are not part of the contractual arrangements between ANSTO and INVAP. These involve the arrangements for the storage and disposal of waste arising from the reprocessing of the spent fuel rods and, relatedly, the timing of any requirement for the provision of an Australian long-term waste storage facility for rods from a new reactor.

9.60 The Committee notes that it is the responsibility of the Commonwealth, rather than of the company contracted to design and construct the new reactor, to make these arrangements. The Committee notes, further, that the arrangements for managing the waste arising from reprocessed spent fuel rods form part of the broader arrangements for managing radioactive waste that arises in Australia from a variety of sources.

9.61 The Committee notes also that it is a condition of the granting of licences to construct and operate the new reactor that proper provision be made for the storage or disposal of both existing and future radioactive waste.

#### *Timing of storage facilities for waste arising from spent fuel rods*

9.62 The Department of Industry, Science and Resources has advised that radioactive waste arising from the reprocessing of spent fuel rods from the new research reactor will not begin to be returned to Australia until about 2025. Waste from the reprocessing of spent fuel rods from HIFAR will begin to be returned in 2015.<sup>60</sup>

9.63 The waste arising from the reprocessing of Australia’s spent fuel rods will be long-lived intermediate level waste. In order to ensure the safety of people and the environment, long-lived intermediate level waste requires shielding but it needs little or no provision for heat dissipation. The radionuclides in long-lived intermediate level waste generally have a half-life of greater than 30 years and up to hundreds of thousands of years.<sup>61</sup> The internationally accepted options for managing such waste are either long-term above ground storage or deep geological disposal. Geological

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59 It was adopted on 5 September 1997; Australia signed the Convention on 13 November 1998.

60 Department of Industry, Science and Resources, submission no. 68, p. 7.

61 *ibid*, pp. 2-3.

disposal involves burying the waste at depths of up to several hundred metres, using a system of engineered and natural barriers within a geologically stable formation.<sup>62</sup>

9.64 The Department of Industry, Science and Resources advised the Committee that since Australia has only a small amount of long-lived intermediate level waste, and since the waste arising from spent fuel reprocessing and from the eventual decommissioning of both reactors will amount, in total, to no more than 56 cubic metres, the 'cost of constructing a deep disposal facility does not appear to be presently justified'.<sup>63</sup> Accordingly, the Commonwealth has determined that Australia's inventory of such waste will be stored 'in an above-ground, purpose-built store'.<sup>64</sup>

9.65 No decision has yet been made on the location for the store for long-lived intermediate level waste. A nationwide search for a site for the store was announced by the Minister for Industry, Science and Resources, Senator Nick Minchin, on 11 August 2000.<sup>65</sup>

9.66 ANSTO's submission states that: 'It is expected that a preferred site will be identified within the next few years'.<sup>66</sup> It expressed the view that:

The process announced by the Minister on 11 August for finding a site for the national store for long-lived intermediate level waste provides confidence that the necessary facilities will be available in ample time to accommodate the small volume of wastes to be returned to Australia from the reprocessing of research reactor spent fuel from both HIFAR and the replacement reactor.<sup>67</sup>

#### Potential difficulties in guaranteeing provision of a store

9.67 On 24 January 2001, Senator Minchin named a site known as Evett's Field West, north-west of Woomera in South Australia, as the Government's preferred site for the near-surface repository for low level and short-lived intermediate level radioactive waste.<sup>68</sup> This announcement was the culmination of a process, begun in

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62 Senate Select Committee on the Dangers of Radioactive Waste, *No Time to Waste*, April 1996, p. 116.

63 Department of Industry, Science and Resources, submission no. 68, pp. 7-8.

64 *ibid*, p. 8.

65 *ibid*, p. 7; ANSTO, submission no. 118, p. 42.

66 ANSTO, submission no. 118, p. 42.

67 *ibid*, p. 43.

68 Senator Nick Minchin, Media Release, 24 January 2001, <http://www.minister.industry.gov.au/minchin/releases/2001/january/cmr029%2D01.doc> (25 January 2001).

1992, to identify a suitable site for a national near-surface repository for the disposal of that type of waste.<sup>69</sup>

9.68 The chosen site is to be subject to an environmental impact assessment, along with two alternative sites to the north-east of Woomera. Environmental assessment is expected to take about a year, and Senator Minchin has advised that the repository would not be operational until sometime during 2002 at the earliest.<sup>70</sup>

9.69 The 1992 discussion paper on the repository for low and short-lived intermediate level waste identified the possibility of locating an above ground store for long-lived intermediate level waste at the same site.<sup>71</sup> The possibility of co-locating the two facilities was flagged again in 1997, in the Phase 3 discussion paper for the radioactive waste repository site selection study.<sup>72</sup>

9.70 The draft Environmental Impact Statement for the replacement reactor project also noted that:

The Commonwealth, State and Territory Governments agree that co-location of the storage facility [for long-lived intermediate level waste] and the repository as a single site would provide a comprehensive strategy for Australia's small inventory of radioactive waste.<sup>73</sup>

9.71 With the selection of the preferred site for the near-surface repository in South Australia, however, came opposition from within that State to the option of co-locating the long-lived intermediate level waste store with the repository. This opposition came from individuals, community and environmental groups as well as from all political parties.<sup>74</sup>

9.72 On 15 November 2000, the South Australian Parliament passed a bill prohibiting the establishment of such a storage facility in South Australia and prohibiting the importation or transportation of waste to it.<sup>75</sup> Manifestly, the consensus

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69 National Resource Information Centre, *A Radioactive Waste Repository for Australia: Methods for Choosing the Right Site*, A Discussion Paper, 1992, p. 1.

70 Senator Nick Minchin, Media Release, 24 January 2001, <http://www.minister.industry.gov.au/minchin/releases/2001/january/cmr029%2D01.doc> (25 January 2001).

71 National Resource Information Centre, *A Radioactive Waste Repository for Australia: Methods for Choosing the Right Site*, A Discussion Paper, 1992, p. 5.

72 Bureau of Resource Sciences, *A Radioactive Waste Repository for Australia: Site Selection Study – Phase 3*, A Public Discussion Paper, November 1997, p. 3.

73 PPK Environment & Infrastructure Pty Ltd, *Replacement Nuclear Research Reactor: Draft Environmental Impact Statement*, Volume 1/Main Report, July 1998, p. 10-37.

74 See, for example, Ms Lu White, submission no. 16; Mr Greg Were, submission no. 42; Messrs Rosemary and Lawrence Toogood, submission no. 58; Mr Liam Gerner, submission no. 98; and Campaign Against Radioactive Waste (Port Augusta), submission no. 106.

75 Legislative Council, Parliament of South Australia, *Hansard*, 10 October 2000, <http://www.parliament.sa.gov.au:8080/ISYSquery/IRLFE6B.tmp/1/doc> (2 November 2000).



between Commonwealth and State governments on the desirability of co-locating the store and repository has not held.<sup>76</sup>

9.73 On 8 February 2001, Senator Minchin announced that, given ‘the lack of unanimity among States and Territories about the desirability of a national store for all of Australia’s intermediate-level radioactive waste’, the Federal Government would establish a storage facility on Commonwealth land for intermediate-level radioactive waste produced by Commonwealth agencies. This facility is to house the long-lived intermediate level waste generated by the facilities at Lucas Heights, and by other Commonwealth agencies, including the Department of Defence. Senator Minchin said that:

Individual States and Territories will now have to decide whether to build their own storage facility for intermediate-level waste or to negotiate with the Federal Government for access to the national store.<sup>77</sup>

9.74 The site selection process for the long-lived intermediate level waste storage facility is to involve a nation-wide search based on scientific and environmental criteria, and is to be overseen by an independent, expert advisory committee. The earliest that a preferred site for the Federal store could be announced ‘would be late 2002’.<sup>78</sup>

9.75 The Committee considers that Senator Minchin’s announcement of 8 February 2001, made in response to the popular and legislative opposition to the co-location of a storage facility for long-lived intermediate level waste with the repository for low level waste in South Australia, illustrates the political difficulty likely to be encountered in constructing a storage facility in any location.

9.76 Both government and opposition MPs from South Australia recognised in evidence before the Committee that State legislation could not prevent the Commonwealth Government from establishing a storage facility on Commonwealth land anywhere in Australia. They also recognised, however, that the Commonwealth Government may be reluctant to enforce its rights against the strongly expressed views of a particular community.<sup>79</sup> As Dr John Loy, Chief Executive Officer, ARPANSA, frankly put it:

I have no doubt that it will be a hell of a problem ... But the proponents of the store – the Minister and the department – will no doubt have to engage in a long and tough process of talking and consulting with people, and there

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76 Hon. Iain Evans MP, *Committee Hansard*, 2 February 2001, pp. 433ff; and Mr John Hill MP, *Committee Hansard*, 2 February 2001, pp. 444ff.

77 Senator Nick Minchin, *Media Release*, 8 February 2001, p. 1.

78 *ibid*, p. 2.

79 Hon. Iain Evans MP, *Committee Hansard*, 2 February 2001, pp. 442-443; Mr John Hill MP, *Committee Hansard*, 2 February 2001, pp. 457-458.

will be a lot of alarms and excursions between now and a store being established. That is the reality of it. I cannot argue with that.<sup>80</sup>

9.77 The Committee notes that before ARPANSA issues a licence to construct the new reactor, it must be satisfied with the state of the arrangements proposed to manage the waste arising from the reprocessed spent fuel. Dr Loy advised the Committee that, in issuing the licence authorising ANSTO to prepare the site for the new research reactor, he had noted the Government's stated commitment to address disposal of long-lived intermediate level radioactive waste. He 'formed the view that a framework existed to tackle the waste issues ... [and] that alternatives could be developed if elements of this framework were not to materialise for some unforeseen reason'.<sup>81</sup>

9.78 An application for a licence to construct the replacement reactor is expected to be sought during 2001.<sup>82</sup> Dr Loy has advised that, at the time of a decision on that licence, the following would have to apply:

- arrangements for the reprocessing of the specific fuel proposed for use in the reactor would need to be demonstrated to be available when the reactor would be in operation; and
- there would need to be progress on the strategy to establish a store for ILW [Intermediate Level Waste], including for the waste arising from the reprocessing of spent fuel.<sup>83</sup>

9.79 It is expected that an application for a licence to operate the replacement reactor will be sought in 2005. At the time of a decision on that licence, Dr Loy advised that:

- the arrangements for reprocessing of its spent fuel would need to be entirely firm;
- with regard to the ILW store, there would need to be substantial and evident progress – such as the features of the design settled, siting criteria established and a strategy and timetable in place for a site(s) – that it was moving forward with clear paths to its future establishment and the CEO could be satisfied that a store will exist.<sup>84</sup>

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80 Dr John Loy, *Committee Hansard*, 9 February 2001, p. 553.

81 ARPANSA, submission no. 144, p. 6.

82 See for example, Professor Helen Garnett, *Committee Hansard*, 9 February 2001, p. 524.

83 ARPANSA, submission no. 144, p. 7.

84 *ibid.*

9.80 The Committee notes, then, the Minister's advice that late 2002 is the earliest that a preferred site for the store could be announced.<sup>85</sup> It notes that the naming of the preferred site will be followed by a comprehensive EIS process involving public consultation, before features of the store's design can be settled. It notes finally, that this process must be sufficiently advanced by the time an application for a licence to operate the new reactor is made in 2005, that ARPANSA can 'be satisfied that a store will exist'.

**9.81 The Committee considers that assurances concerning the timely establishment of a storage facility for waste arising from the reprocessing of Australia's spent fuel rods must be critically examined. The Committee once again notes the pre-conditions proposed by the McKinnon Review namely that a solution to the problem of waste 'was essential and necessary well prior to any future decision about a new reactor.'**<sup>86</sup>

**9.82 The Committee condemns the Government for ignoring this important recommendation of the McKinnon Review.**

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85 Media Release, Senator Nick Minchin, Minister for Industry, Science and Resources, 8 February 2001, <http://www.minister.industry.gov.Australia/minchin/releases/2001/february/cmr054%2D01.doc> (5 March 2001).

86 K. R. McKinnon et al., *Future Reaction: Report of the Research Reactor Review*, August 1993, p.xxii.

