

# Nuclear Free Local Authorities

# RADIOACTIVE WASTE POLICY



## Briefing on the Government Review

No 5 August 2000

### UK STRATEGY FOR RADIOACTIVE DISCHARGES

Controversy about the future of reprocessing surrounds the Government's draft strategy for radioactive discharges in the period 2001 to 2020<sup>1</sup>. The draft strategy describes how the UK intends to implement the agreement on radioactive substances reached at the 1998 Ministerial meeting of the OSPAR Commission<sup>2</sup>. The strategy has three main aims:

- progressive and substantial reductions in radioactive discharges from the UK as a whole and from each of the main sectors responsible for such discharges;
- progressive reduction of human exposure to ionising radiation resulting from radioactive discharges, so that no member of the general public in the UK will be exposed to a dose of more than 0.02 milliSievert (mSv) a year, as a result of authorised radioactive discharges made from 2020 onwards;
- progressive reductions in concentrations of radionuclides in the marine environment resulting from radioactive discharges, such that by 2020 they add close to zero to historic levels.<sup>3</sup>

Controversy has arisen for a number of reasons. Firstly, because the Government has blithely accepted BNFL's statement that the reprocessing of Magnox spent fuel is likely to cease by 2012, which would be a critical 'landmark' in the achievement of the 2020 dose reduction and radionuclide concentration deadlines. Secondly, because the Government continues to turn a deaf ear to calls for a proper examination of the pros and cons of the dry storage of Magnox spent fuel, which is the main alternative to reprocessing. And thirdly, because the Government's continued failure to address alternatives is attracting the opprobrium of the majority of OSPAR member states. These issues are examined further below.

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<sup>1</sup> DETR, 'UK Strategy for Radioactive Discharges 2001 - 2020: Consultation Document', June 2000. The DETR has requested comments by 22 September. Copies are available from: DETR Free Literature, PO Box 236, Wetherby, West Yorkshire, LS23 7NB (Tel 0870 122 6236).

<sup>2</sup> The 1992 OSPAR Convention requires the prevention and elimination of marine pollution in the North-East Atlantic region, including the Irish Sea. The OSPAR member states meet annually to adopt measures necessary to comply with the Convention. Member states include Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the European Union.

<sup>3</sup> As '1', Executive Summary, para 2.

## **WHY ENDING MAGNOX REPROCESSING IS A CRITICAL ‘LANDMARK’**

The Interim Report of the Discharges Working Group (DWG) of the BNFL Stakeholder Dialogue process<sup>4</sup>, shows why the ending of Magnox reprocessing is important, particularly to achieving substantial reductions in radiation doses to members of the public in the liquid discharges ‘critical group’<sup>5</sup>.

This is because for future discharges from the Sellafield site, it is estimated that Magnox reprocessing will contribute around 80% to 90% of the liquid discharges critical group dose, which can vary from less than 0.025 mSv a year at low reprocessing throughputs to over 0.05 mSv a year at relatively high throughputs<sup>6</sup>.

The DWG Interim Report shows that the most certain way of bringing the overall liquid discharge critical group dose down to below 0.02 mSv a year by 2020 - as proposed in the draft UK strategy - is to stop Magnox reprocessing<sup>7</sup>.

## **WHEN WILL MAGNOX REPROCESSING END?**

In May, BNFL announced a revised lifetime strategy for its Magnox nuclear power stations. As shown in Table 1, most of the stations are planned to have extended lives of between 40 and 50 years.

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<sup>4</sup> BNFL National Stakeholder Dialogue, ‘Discharges Working Group Interim Report’, 28 February 2000, published by the Environment Council. The Interim Report is categorised as “work in progress”. BNFL established the national dialogue with ‘stakeholders’ in September 1998. Stakeholders include the Government, regulatory bodies, environmental groups and local authorities (including the NFLAs). Within this process, the Discharges Working Group was set up to recommend a framework for BNFL’s management of Sellafield discharges, with particular emphasis on the OSPAR agreement.

<sup>5</sup> In order to predict radiological impacts on people, the concept of the ‘critical group’ is used. For a given source of discharges, this will be the hypothetical group who are likely to receive the highest dose as a result of that source. In the case of liquid discharges from Sellafield, the critical group consists of high rate consumers of local fish and shellfish in west Cumbria.

<sup>6</sup> As ‘4’, Table 2 and para 3.8. These critical group figures exclude the dose from historic discharges. It should also be noted that critical group dose projections are indicative: they are derived using mathematical modelling techniques so inevitably involve uncertainty.

<sup>7</sup> This point is graphically illustrated in Figures 5.1 and 5.2 of the DWG report. Although the latter figure illustrates that the introduction of abatement technology - particularly for Technicium discharges - could help reduce doses, B205 plant closure is probably the only way of achieving the 2020 dose reduction deadline.

| <b>TABLE 1: MAGNOX STATION LIFETIMES</b> |                       |                       |
|--|-----------------------|-----------------------|
| <b>Station</b>                           | <b>Latest Closure</b> | <b>Age at Closure</b> |
| Hinkley Point                            | 2000                  | 35                    |
| Bradwell                                 | 2002                  | 40                    |
| Dungeness A                              | 2006                  | 40                    |
| Sizewell A                               | 2006                  | 40                    |
| Calder Hall                              | 2006-8                | 50                    |
| Chapelcross                              | 2008-10               | 50                    |
| Oldbury                                  | 2013                  | 45                    |
| Wylfa                                    | 2016-21               | 45-50                 |

The closure dates for Oldbury and Wylfa depend on the successful development and use of a ceramic oxide fuel, known as MagRox<sup>8</sup>. If this proves impracticable, these stations would close around 2010-11.

According to BNFL:

The lifetime strategy announcement means that the Magnox reprocessing plant (B205) at Sellafield will close once all Magnox fuel has been reprocessed. It is expected that this will be around 2012 although this could be later depending on throughput schedules achieved.<sup>9</sup>

By the time of a parliamentary debate on 21 June, the important qualification about throughput schedules appears to have been forgotten. Replying for the Government, Chris Mullin argued that the Magnox station closures would enable the reprocessing of Magnox fuel to be brought to an end by about 2012, “so an important step in reducing discharges will be accomplished well before 2020”<sup>10</sup>. The Government’s draft discharges strategy also relies on an expectation that Magnox reprocessing will cease by around 2012<sup>11</sup>.

The difficulty here is that the 2012 closure date for B205 depends upon securing and sustaining large improvements in Magnox reprocessing throughput. Recent performance has been poor: BNFL reprocessed Magnox spent fuel at a rate of 600 tonnes in 96-97, 520 tonnes in 97-98 and 465 tonnes in 98-99. With the new Magnox station closure dates, BNFL will have a total of around 12,000 tonnes of spent fuel to reprocess before B205 closure. Table 2 illustrates how long this will take with different B205 annual throughputs.

<sup>8</sup> Unlike metal Magnox fuel, MagRox fuel would not be reprocessed in the Magnox reprocessing plant, B205, but could be reprocessed in THORP. If BNFL can convince the Nuclear Installations Inspectorate that an adequate safety case can be made, the company expects to take a decision on the use of Magrox fuel in 2003.

<sup>9</sup> BNFL, ‘BNFL Confirm Magnox Station Lifetimes’, Press Release, 23 May 2000.

<sup>10</sup> Parliamentary Debate, Hansard, 21 June 2000, column 96.

<sup>11</sup> As ‘1’, para 7.3.10.

| <b>TABLE 2: MAGNOX REPROCESSING LIFETIMES</b><br>(assuming 12,000 tonnes is to be reprocessed) |                     |
|--|---------------------|
| <b>Annual Throughput (tonnes/year)</b>   | <b>Closure Date</b> |
| 400  | 2030                |
| 600  | 2020                |
| 800  | 2015                |
| 1000   | 2012                |
| 1200   | 2010                |

*This table shows that BNFL must rapidly get back up to throughputs of around 1000 tonnes per year, and sustain that level of throughput over 12 years in order to achieve B205 closure in 2012. In the light of the plant's age and recent operating history, there must be a major question mark over whether this can be achieved. If it is not, a significantly longer period of operation is possible, potentially threatening the proposed 2020 dose reduction and radionuclide concentration deadlines.*

## **THE DRY STORAGE OF MAGNOX SPENT FUEL**

In its draft discharges strategy, the DETR reports the interim findings of the DWG in the following terms:

The group considered four possible scenarios for future activities at Sellafield, ranging from the complete and immediate closure of reprocessing plants and the Calder Hall reactor, to the continuation of Magnox and oxide fuel reprocessing to 2023/24. It was accepted that the first option was impractical because of the inventory of spent Magnox fuel currently awaiting reprocessing and that the last option would not be acceptable on discharge grounds without substantial abatement technology. The group considered that the most appropriate profile of discharges and doses would lie in 'region of optimisation' between these two extremes.<sup>12</sup>

This statement has caused consternation for two key reasons:

- it suggests that all stakeholders in the DWG agreed that it was acceptable for reprocessing to continue, and that this would be consistent with the OSPAR strategy. In contrast, the DWG report actually states that its findings were "subject to the caveat that they do not indicate any change of views by those members of the group who believe that early cessation of reprocessing is the best way of reducing discharges"<sup>13</sup>.
- it suggests that all stakeholders in the DWG agreed that the current inventory of Magnox spent fuel has to be reprocessed. In contrast, the DWG states that

<sup>12</sup> As '1', para 7.3.7.

<sup>13</sup> As '4', p17.

“Other members of the group .. would advocate maximising the amount of Magnox spent fuel, currently in stores or ponds, going into dry storage .. We recognised that the technical and safety issues around Magnox dry storage were complex and were unable to explore them in the time available”<sup>14</sup>.

In fact, it is widely recognised that the dry storage of Magnox spent fuel is technically feasible<sup>15</sup>. However, there are real concerns about its desirability and practicability.

Of primary concern in an assessment of desirability is that the dry storage of Magnox spent fuel would not accord with the regulatory concept of ‘passivity’, which places an emphasis on the need for physically and chemically stable waste forms<sup>16</sup>. However, reprocessing creates Highly Active Liquid waste, which is not passively safe and which has been the subject of particular regulatory concern following sustained effort by the NFLAs to draw attention to the scale of the hazard<sup>17</sup>. It also leads to the storage of plutonium oxide powder which is not suitable for long-term passive storage. An assessment of desirability also needs to take account of potential discharge impacts. As explained above, continued reprocessing of Magnox spent fuel could jeopardise compliance with the 2020 dose reduction and radionuclide concentration deadlines. Further consideration, therefore, needs to be given to weighing up whether continued reprocessing or dry storage is the least undesirable approach.

The issue of practicability is also complex. First, undertaking the necessary development work and securing regulatory and planning approval for dry storage could take a considerable period of time (6-8 years). However, at the end of that time there would still be between 4000-9000 tonnes of Magnox spent fuel requiring management. Another key consideration is relative costs, which involves a comparison of the costs of B205 refurbishment (eg to achieve increased throughputs) and continued operation, with the costs of setting up and running dry storage facilities.

*In view of the importance to the proposed UK discharges strategy of ending Magnox reprocessing, there is a clear case for a thorough and open review of Magnox spent fuel management options.*

## **UK AND FRANCE INCREASINGLY ISOLATED**

This case is strengthened by the outcome of the annual meeting of the OSPAR Convention which was held in Copenhagen at the end of June. A three quarter majority of OSPAR countries<sup>18</sup>, including five of BNFL’s customer countries, voted in favour of a resolution which requires relevant contracting parties to review

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<sup>14</sup> As ‘4’, para 3.6.1.

<sup>15</sup> RWMAC, 11th Annual Report, 1990.

<sup>16</sup> Magnox fuel consists of uranium metal in a magnesium oxide cladding. Both the uranium metal and the cladding are chemically reactive. The dry storage of Magnox spent fuel would therefore involve active safety systems.

<sup>17</sup> A programme is underway to process the highly active liquid (HAL) waste into glass blocks. The Nuclear Installations Inspectorate requires that stocks of HAL be reduced to ‘buffer levels’ by 2015.

<sup>18</sup> The countries were Belgium, Denmark, Finland, Germany, Iceland, Ireland, Norway, the Netherlands, Portugal, Spain, Sweden and Switzerland.

discharges from reprocessing facilities with a view to “implementing the non-reprocessing option (for example dry storage) for spent nuclear fuel management”<sup>19</sup>.

Although BNFL have argued that the resolution “will have no bearing upon the operations at Sellafield” because OSPAR resolutions are only binding on those countries which sign them<sup>20</sup>, there is no doubt that the UK and France are becoming increasingly isolated. As Greenpeace remarked, “never before has such a strong message been sent by so many countries calling for an end to reprocessing”<sup>21</sup>.

## CONCLUSIONS

Domestic and international developments point to the need for a thorough and public examination of Magnox spent fuel management options. This should entail a critical appraisal of the likelihood that Magnox reprocessing will have to continue beyond 2012, and of the desirability and practicability of an alternative strategy based on dry storage. The impending Government review of radioactive waste management provides a good opportunity to examine these matters. That opportunity should not be squandered.

*Readers are urged to use the information in this briefing in responses to the DETR consultation on the proposed UK discharges strategy. The DETR has requested comments by 22 September<sup>22</sup>.*

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<sup>19</sup> OSPAR Convention, ‘Decision on Substantial Reductions and the Elimination of Discharges, Emissions and Losses of Radioactive Substances, with Special Emphasis on Nuclear Reprocessing’, June 2000.

<sup>20</sup> BNFL, ‘OSPAR Meeting in Copenhagen’, Sellafield Newsletter, No. 664, June 2000.

<sup>21</sup> Greenpeace, ‘NE Atlantic Countries call on UK and France to End Nuclear Reprocessing’, Press Release, 29 June 2000.

<sup>22</sup> In England and Wales responses should be sent to ‘Radioactive Discharges Consultation’, DETR, 4/E6 Ashdown House, 123 Victoria Street, London SW1E 6DE. In Scotland, response should go to Steven Macgregor, Scottish Executive, Environment Protection Unit, Radioactive Waste Team, Area 1-J (N), Victoria Quay, Edinburgh EH6 6QQ. Finally, in Northern Ireland responses should be sent to Paul Burns, Environmental Protection Division, Department of the Environment, River House, 48 High Street, Belfast BT21 2AR.