

## SPENT FUEL MANAGEMENT – A PERSPECTIVE ON THE UK

**Fred Barker, Independent Nuclear Policy Analyst,  
March 2005**

### **1 Background: the UK Commitment to Reprocessing**

The UK has two reprocessing plants, both located at Sellafield in West Cumbria:

- B205: for reprocessing metallic spent fuel from the Magnox stations
- THORP: for reprocessing oxide spent fuel from the UK and overseas

Reprocessing has been highly contentious in the UK. Critics point to high costs, discharges to the environment, and little prospect for the use of plutonium and reprocessed uranium.

But reprocessing has survived because:

- B205: Magnox spent fuel is mainly stored wet, making it difficult to condition for long-term storage and disposal.
- THORP: there is limited storage capacity for AGR spent fuel, substantial cash payments from overseas countries and contract terms that make unilateral withdrawal extremely difficult.

In addition, the economy of West Cumbria has depended heavily on the jobs generated by reprocessing at Sellafield.

### **2 The Current Position**

Anticipated closure dates are:

- B205                    2012 (assumes 1000 t/y)
- THORP                2010 (assumes 750 t/y and no new post-baseload contracts)

Over its lifetime, THORP is likely to reprocess 5600 tU of AGR spent fuel, and 6600 tU of overseas LWR spent fuel.

By 2012, the UK will have separated 105 tonnes of plutonium from Magnox and AGR spent fuel, and 37 tonnes from overseas customers' spent fuel.

No UK reactors are licensed to use plutonium fuels. UK plutonium is stored as plutonium dioxide powder at Sellafield.

Despite the commitment to reprocessing, the UK is unlikely to reprocess all its spent fuel. It is anticipated that extended storage will be required for:

- 2900 tU of AGR spent fuel
- 1200 tU of Sizewell B PWR spent fuel.

The UK therefore has to decide what to do with:

- its large stockpile of plutonium
- a significant amount of AGR and PWR spent fuel.

### **3 Stakeholder Dialogue and Alternative Strategies**

From 1998 to 2004, BNFL sponsored a process of ‘National Dialogue’ with key stakeholder groups, including the regulators, local government, trade unions and environmentalists. The Dialogue was facilitated by an independent third party called The Environment Council.

The Dialogue has produced detailed reports encouraging BNFL to work on contingency plans and alternative approaches. In particular, the Company has undertaken new work on Magnox spent fuel and plutonium management options.

#### *Contingency planning for Magnox spent fuel*

There is a significant risk that B205 will not reprocess all Magnox spent fuel by its closure in 2012. BNFL has therefore examined other ways of managing Magnox spent fuel. The company has undertaken full-scale durability trials on encapsulated wetted Magnox spent fuel, which have been “encouraging”. It has also examined the potential of dry storing Magnox fuel that has not been wetted. No major technical ‘show-stoppers’ have been identified. The company is also undertaking R&D into the thermal and corrosion effects associated with long-term storage.

#### *R&D on options for plutonium management*

BNFL considers that the implementation of a plutonium disposition programme should start within 25 years, with key decisions expected in the period 2009-2014.

To help inform these decisions, it is carrying out R&D on:

- the characterisation of plutonium stocks;
- the properties of potential ceramix immobilisation matrices (including ‘low spec’ MOX);
- process designs for immobilising plutonium in candidate ceramic matrices;
- evaluation of optimum fuel types for reactor utilisation (including ‘inert matrix fuels’);
- assessment of the likely acceptability of immobilised plutonium and/or irradiated plutonium for long-term storage and/or disposal; and
- comparative assessments of the economics of immobilisation and reactor usage.

The process of ‘stakeholder dialogue’ has helped establish this emphasis on contingency planning and alternatives.

### **4 New Arrangements for Nuclear Clean-Up and Decommissioning**

A new public body – the Nuclear Decommissioning Authority (NDA) – has been created in the UK to take strategic responsibility for the UK’s nuclear legacy, including spent fuel and plutonium management.

The NDA will be responsible for the sites now owned by BNFL and UKAEA, and for developing comprehensive long-term plans for the clean-up of each site. Contractors will be appointed to manage and operate each site (initially BNFL and UKAEA). The contractors will be accountable to the NDA for meeting performance objectives.

Openness, transparency and stakeholder engagement are stated to be founding principles of the NDA. The NDA is setting up a new 'National Stakeholder Group' (NSG) and 'Site Stakeholder Groups' (SSG) at each of its sites. These stakeholder groups will be involved in the development of the NDA's strategy and annual plans so that in reaching decisions:

- the NDA is exposed to, and takes account of a diverse range of views; and
- the process and rationale for major decisions are clear to stakeholders.

In the future, the NSG and SSGs are likely to be involved in discussions about:

- the options for plutonium management, including immobilisation and use in reactors; and
- the options for managing the AGR and Sizewell B spent fuel that will not be reprocessed.

The recent history of stakeholder dialogue and the creation of the NDA should mean that the UK is now well placed to have an open and rigorous appraisal of the pros and cons of the different options.

Finally, an independent body – the Committee of Radioactive Waste Management (CoRWM) – has been set up to advise the UK Government on long-term approaches to the management of radioactive wastes and materials. The Committee – of which I am a member – has its own budget to commission specialist papers, and to organise consultation with stakeholders and the public. The Committee is proposing a short-list of options that include various forms of long-term interim storage, and/or shallow or geological disposal. After an appraisal of these options, the Committee will make recommendations to Government. It is scheduled to make its recommendations in July 2006.

## **5 Concluding Remarks**

In the UK, the end of reprocessing is in sight, and attention is turning to alternative strategies for managing spent fuel and plutonium.

From 1998 to 2004, BNFL sponsored a 'National Dialogue' that helped lay the ground for future assessments of these strategies. These assessments are likely to involve the new arrangements for stakeholder engagement being set up by the NDA. There is a strong expectation that these assessments will be undertaken in an open, participative and rigorous way.

An independent committee – CoRWM – has been established to advise the UK Government on policy for managing radioactive wastes in the long-term. To help prepare this advice, CoRWM is able to commission work from specialists and organise its own programme of public and stakeholder engagement.