Magnox Task Group – Draft Working Paper

Magnox Station Lifetimes and Reprocessing Throughput

1. The announcement made by BNFL on 23 May 2000 (attached as Appendix 1) relating to the expected lifetimes of Magnox stations and the closure of B205, caused the dialogue process to experience its most critical period of uncertainty about its future since it began. Green stakeholders saw the announcement of the 2012 closure date for B205 as having ignored the work carried out in the Waste and Discharges Working Groups. The programme announced, while within the envelope defined by both groups, was near the 'blue sky' end of the spectrum and certainly did not seem to have placed any weight on green aspirations to move to the other end of the envelope.

2. In light of the announcement both WWG and DWG have reconvened to examine how the announcement has affected their respective reports. Also, the announcement introduced the little-discussed Magrox fuel issue (which had already caused controversy in the earlier groups) for introduction into the cores of Oldbury and Wylfa. The announcement also extended the lifetimes of some Magnox stations – including these two – beyond the point where some felt safety cases could be expected to be made. Finally, the closing date for B205 was predicated on a major improvement in throughput compared to actual recent performance.

3. The company, for their part, believed that the announcement had been influenced by the dialogue in that it did not go to the extremes of the company's 'blue sky' scenario for Magnox. Rather, by clarifying the position on Magnox lifetimes, it removed much of the doubt which had concerned the communities, the workforce, local authorities and regulatory bodies involved with operating and regulating these plants. The company also believes that B205 throughput can be rapidly increased and stated its aim as maximising the revenue-earning lifetime of the Magnox Stations while de-coupling their operation as quickly as possible from B205. Thus the introduction of Magrox fuel into the concrete pressure vessels of Oldbury and Wylfa would allow this fuel to be stored or reprocessed through Thorp while allowing the last of the Magnox fuel to pass through B205 by 2012.

4. The controversy caused by the announcement was so marked that it was agreed by the co-ordinating committee to establish what became known as the 'bridge mechanism'. This is a hot-line communication which will allow the company to discuss upcoming announcements with the green stakeholders, giving sufficient pre-warning to allow the underlying reasons for the announcement to be discussed with the company. The green stakeholders would hear directly from the company the justification for the announcement and to what extent the dialogue had - or had not - influenced it. This is standard practice with the company's other stakeholder groups such as the unions, the regulators, customers and local authorities. Since the establishment of the 'bridge mechanism', it has been used only once, but with some positive effect. When the company released it's accounts, the greens were

given prior notice and a conference call too place between representatives of BNFL, Friends of the Earth, Greenpeace and CND which allowed the greens to hear first hand why the accounts showed such poor performance.

5. At subsequent meetings of the working groups and of individual stakeholder groupings, the issues were again debated. However, despite additional information being provided by BNFL (attached as Appendices 2 and 3), some uncertainties remained. A Task Group was set up to address the issues which, in broad terms, addressed the perceived lack of information about the assumptions inherent in BNFL's Magnox closure plan and a lack of clarity as to how the dates suggested for closure of the power stations and B205 had been arrived at and how they would be implemented.

6. Specifically, there were green concerns that at current stock levels and reprocessing performance, the 2012 closure date for B205 was highly optimistic and unlikely to be met. This would not only extend the overall discharge period for B205 but would be hard to reconcile with meeting OSPAR requirements. It was also noted that the proposed doubling of reprocessing rate in B205 would lead to increased discharges – again with implications for the OSPAR agreement. Other concerns included the possible use of Magrox fuel via initial trials at Calder Hall and subsequent trials and full loading at Wylfa and Oldbury, the go/no go decision date for the commercial use of Magrox and information on the safety cases for its use at the two latter stations.

7. The new Task Group, which met on 1 November, was tasked to identify the uncertainties and assumptions contained in BNFL's Magnox Stations/B205 closure programme. The membership of the Task Group is attached as Appendix 4. Issues raised, and clarifications sought, by members of both current working groups were addressed by the Task Group with the aim of 'fleshing-out' and making transparent the full implications of BNFL's Magnox closure programme. . It should be noted that all dates discussed are indicative. The rest of this report summarises these discussions.

Magnox Stations

8. Magnox station lifetimes are dependent on a number of issues.

- Every Magnox station must maintain a valid safety case which is a requirement of the Site Licence from the NII. These safety cases evolve to take account of operational developments at the station, graphite degradation and other ageing effects, unforeseen occurrences and the normal cycle of maintenance, fuel loading etc etc. Major Periodic Safety Reviews are undertaken at ten yearly intervals. These are in themselves expensive and can actually bound a station lifetime as in the case of the early closure of Hinkley A in May 2000. Oldbury and Wylfa are due to undergo PSRs in 2008 and 2004 respectively. In addition any full loading of Magrox would be the object of a specific safety case submission and approval by the NII.

- Every station must also have a valid Discharge Authorisation from the Environment Agency, and these will be influenced by factors such as OSPAR interpreted via the UK National Discharge Strategy.

- Plant must be able to generate income by selling electricity. However, the economic balance of each station in the Magnox fleet has to be considered in the context of the performance of the overall Magnox cycle from fuel fabrication, plant operation, spent fuel management and overall liability exposure.

- The economic performance of the Magnox stations depends strongly on their availability and the coming back on stream of Wylfa is clearly important in this respect.

- The price of electricity is also an important determining factor, and the 'New Electricity Trading Arrangement (NETA) could significantly affect market prices.

- Wylfa and Oldbury have sufficient projected life to consider loading of Magrox fuel. This fuel has similar characteristics to AGR fuel, and after discharge from the reactors could be stored or reprocessed through Thorp. This would decouple the operation of these stations from B205, which is scheduled to close "around 2012 although this could be later depending on throughput schedules achieved".

- If Magrox is not adopted for these stations then their closure dates would need to be advanced unless a satisfactory alternative management for Magnox fuel could be identified. Options include temporary dry storage pending reprocessing through a modified Thorp or some other treatment yet to be identified.

- Ability to load Magrox fuel depends on:

  - Successful trial loadings in Calder and Wylfa
  - The availability of safety cases
  - The economic viability of the Magrox fuel cycle

- In order to meet a date of 2012 for full core transition from Magnox to Magrox a decision will be necessary 9-10 years earlier because:

  - It will take about 3 years to build and commission a fuel assembly line at Springfields
  - It will take 1-2 years to make sufficient Magrox fuel for smooth transition to begin.
  - It will take about 5 years for full Magnox to Magrox transition at the station(s).

- Reactor operation also depends on an adequate transport infrastructure, including flasks, to keep pond stocks at the stations at acceptable levels and/or enable adequate throughput through B205.

B205 Throughput

9. It is in BNFL's commercial interests to close B205 as soon as possible after the closure (and subsequent loss of income from) the Magnox power stations. The current proposed closure date for B205 is 2012 but, should the Magnox stations fail to achieve the lifetimes announced by BNFL because of economic or safety consideration, the timeframe for B205 closure would obviously be affected. Similarly, if B205 throughputs cannot be sustained, BNFL would have to re-evaluate its Magnox generation strategy given it's announcement about predicated lifetime dates.

10. As well as the technical issues associated with the B205 plant, achieving the projected throughput depends on being able to transport used fuel to Sellafield (number of flasks and fuel in flasks) at the rate required by B205 and the ability to feed that fuel through the Sellafield system into the plant.

11. Noting that the total discharge from B205 is finite, and linked solely to the quantity of fuel reprocessed:

    - Throughput rate links directly to changes in discharge rate
    - Tc99 discharges and some other aerial and gaseous discharges will continue for up to 5 years after the shutdown of B205.

12. If B205 throughput, currently planned to exceed 1000 tonnes per annum, is not achieved the options open to the company include:

    - Reprocessing through new Thorp head end
    - Dry store pending some other treatment yet to be identified
    - Close Magnox stations earlier than planned.

13. Currently B205 is closed for refurbishment, it is expected to reopen towards the end of the year. Given that:

    a) BNFL want to close B205 by 2012 or not too long after
    b) There is a current stock (as at 1/04/00) of 7560 tonnes of spent Magnox fuel
    c) All other variables meet expectations

14. Then if the planned B205 throughput increases are not achieved, it can be seen that at some time over the next 2 to 4 years decisions will have to be made about closing Magnox power stations earlier than planned or finding an alternative route for Magnox spent fuel.

15. The existing Magnox reprocessing plant has demonstrated its capability to achieve well in excess of 1000 tonnes annual throughput on a regular basis. Some NGO's retain doubts about this achievement. The only obstacles to a return to those kind of throughput volumes are the levels of manning on the plant and increased availability. Manning levels within the Magnox Reprocessing area are now being

increased. An increase of 15% is now in progress with particular focus on key production areas, such as fuel decanning, B205 charge machines and also on larger production support groups. The scheduled biannual maintenance shutdown began in September and will see the start of a refurbishment programme the aim of which will be to improve the availability and reliability of the key components of the plant.

Appendix 1. BNFL Statement of 23 May 2000

BNFL/1566/00

BNFL confirms Magnox station lifetimes

BNFL is today announcing a lifetime strategy for its fleet of Magnox nuclear power stations. The strategy provides a phased programme for the cessation of electricity generation at the eight stations, most of which began operating in the 1950s and 1960s.

The reactors are licensed to operate for between 33 and 50 years and this early announcement of the Company's strategy for the lifetimes of the stations will allow operational plans to be optimised. For business reasons, Hinkley Point A will not be brought back into service from its current shutdown.

With today's announcement the Magnox station lifetimes will be planned as follows: -

Station	Licensed lifetime	Age at Cessation of Generation	Latest date for end of Generation
Calder Hall	50	50	2006 – 2008
Chapelcross	50	50	2008 – 2010
Bradwell	40	40	2002
Hinkley Point A	40	35	2000
Dungeness A	40	40	2006
Sizewell A	40	40	2006
Oldbury*	40	45	2013
Wylfa*	33	45 / 50	2016 / 2021

* Continuing to run Oldbury and Wylfa to these dates depends upon the development and use of Magrox fuel. Magrox is a fuel in which uranium is used in ceramic oxide rather than metal form. A decision on the use of Magrox fuel will be taken in around 2003. Oldbury and Wylfa will also need to undergo a Periodic Safety Review in order to secure operation to these dates.

BNFL's Chief Executive Norman Askew said: "Everyone knows that these stations have a finite life and there has been speculation as to our intention regarding their operating lives.

The reason we are making this announcement today, well ahead of time, is to provide certainty about the future for all concerned. It will bring clarity to the Company's business plans, explains our plans to our employees and provides us with time to work with the communities around our stations on plans for decommissioning.

"These stations were pioneers in the nuclear industry and have made, and are continuing to make, a huge carbon-free contribution to the electricity generating industry. This decision will mean that the reactors will not be run beyond the dates announced. However, both market conditions and technical issues could result in earlier closure."

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. Based on the same programme, Magnox fuel production, which is carried out at the Company's fuel manufacturing site at Springfields, near Preston, will cease by 2010.

The end of Magnox reprocessing at Sellafield will significantly reduce discharges even further and virtually eliminate the already low discharges of Technetium. Total liquid discharge impact, which is already minute, will further reduce by more than 80 per cent. In the meantime BNFL will continue to work on abatement technology for Technetium and, if successful, will reduce discharges even sooner.

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Notes to Editors

BNFL took over responsibility for the UK's Magnox power stations in January 1998 when the former Magnox Electric plc was merged into BNFL.

There are three other stations in the Magnox fleet which are currently undergoing decommissioning – Berkeley (which closed in 1989), Hunterston A (1990) and Trawsfynydd (1993).

In December 1999, BNFL announced that the Bradwell Power station in Essex will close in 2002 when it reaches its 40th birthday.

The stations employ on average around 350 people each and we expect job numbers to remain fairly constant for up to a year after cessation of generation. From experience at other Magnox sites, we would expect to retrain around 250 staff for the next phase, defuelling, which usually takes 3-4 years. After this phase we would expect numbers employed at the sites to fall gradually to around 50 people.

B205 is the plant built in 1964 to reprocess fuel from the UK's Magnox power stations. Overseas and UK oxide fuel is reprocessed in the separate, more modern, thermal oxide reprocessing plant (Thorp) at Sellafield.

Appendix 2. BNFL Statement of 9 August 2000

The existing Magnox reprocessing plant has demonstrated its capability to achieve well in excess of 1000 tonne annual throughput on a regular basis. The only obstacles to a return to those levels are the levels of manning on the plant and increased availability. Manning levels within the Magnox reprocessing area are now being increased. An increase of 15% is now in progress with particular focus on key production areas, such as fuel decanning, B205 charge machines and also on larger production support groups. The scheduled biennial maintenance shutdown, due to begin in September, will also see the start of a refurbishment programme, the aim of which will be to improve availability and reliability of the key components of the plant.

BNFL's announcement about the predicted lifetimes of the Magnox fleet means that the reprocessing plant will close once all Magnox fuel has been reprocessed. It is expected that this will be around 2012 although we prudently stated at the time of our announcement that this timeframe would obviously depend upon B 205 throughputs being satisfactorily achieved.

Appendix 3. BNFL Statement on B205 throughput, 25 August 2000

Following the announcement about Magnox Station lifetimes, there was concern expressed by some NGOs about the throughput in B205. This note provides some information about what actions BNFL are undertaking to improve reliability in throughput rates.

The major refurbishment of B205, which took place in 1995/96, involved the installation of the new South Dissolver. This shutdown lasted 38 weeks and achieving the installation within time and budget attracted media coverage. It was this media coverage which stated that the new dissolver would allow B205 to operate up to 2016.

During this major shutdown, BNFL commissioned over £100M of new plant. This included the new dissolver, a plutonium evaporator and other projects. Separately, B205 is required to undertake statutory shutdowns every 2 years as an NII requirement under the site licence. These shutdowns, typically lasting 3 months, cover for example plant washout, inspection and maintenance of vessels and pipework. During these statutory shutdowns, we obviously take the opportunity to carry out any minor projects and improvements needed to maintain plant efficiency.

We have a forward programme of about £5M-£10M per year to keep the plant up to date and to replace any equipment. This year's statutory shutdown, scheduled to begin in September, will involve a capital cost of about £5M. Projects due to be implemented during this shutdown relate to safety and reliability improvements to increase throughput.

These include improvements to the fuel charge machine, crane hoist replacement, improvements to containment in certain areas, pump replacements and instrumentation upgrades.

Manpower levels within the plant are also being increased by some 15%. As part of progressively implementing the new contract in partnership with the Trades Unions, we expect additional skills training to lead to improved efficiency and productivity.

The Magnox station lifetime announcement gave 2012 as the projected B205 shutdown date, subject to our achieving the necessary throughput levels. It remains our intent to achieve this date since it will significantly reduce the value of the Magnox Generation business to operate B205 beyond the station shutdown dates. The performance of B205 is critical to the achievement of the station lifetimes so it is BNFL's business interest to achieve the throughputs necessary in B205. Achieving higher throughputs is essential to deliver maximum business value and to minimise liabilities.

Should the Magnox stations fail to achieve the lifetimes we have announced because of economic or safety considerations, the timeframe for B205 closure would obviously be affected. Similarly, if B205 throughputs cannot be sustained, BNFL would have to re-evaluate its Magnox generation strategy given the announcement about predicted lifetime dates.

Appendix 4. Magnox Task Group Membership

Peter Addison	Nuclear Installations Inspectorate
Gregg Butler	Westlakes Research Institute
Mark Drulia	BNFL
Martin Forewood	CORE
Peter Maher	BNFL
Grace McGlynn	BNFL
Richard Mrowicki	BNFL
Pete Roche	Greenpeace UK
Pete Wilkinson	Wilkinson Environmental Consulting