

## UPDATE ON SPENT FUELS AND NUCLEAR MATERIALS

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### ***Introduction***

1. This paper represents the output associated with Task 5a in the CoRWM 2013-2014 workplan. It is presented to update the Committee on developments in managing spent fuels and nuclear materials over the last 12-18 months. The information discussed here was obtained in a meeting with NDA on 23 September 2013. CoRWM participants were Francis Livens and Janet Wilson, and NDA participants were Andrew Craze (NDA Head of Safety and Environment) and Danny Fox (NDA Head of Nuclear Fuel Cycle). The paper has been factually checked by NDA.

### ***General Approach***

2. NDA has devoted substantial effort to integrating the different strands of Spent Fuel and Nuclear Materials management. There is a drive towards clear understanding of the drivers and timescales for different strategic options and also an understanding of interactions and dependencies.

### ***Magnox Fuels***

3. There are approximately 3,200 tonnes of Magnox fuel remaining to be reprocessed and four stations left to defuel, Wylfa (which is still generating), Oldbury, Calder Hall and Sizewell A (which is expected complete defuelling in late 2014).. The Magnox Operating Programme (MOP) now reports a range of end dates between 2017 and 2020 depending on the throughput assumptions used and, if MOP is completed satisfactorily, this will be sufficient to reprocess all Magnox fuel.

4. The NDA recently extended the inventory of the MOP to include the Dounreay Fast Reactor fuel, ca 44 tonnes of material.

5. NDA is developing contingency plans in the event that the MOP cannot be completed, for example, due to a sudden, irreversible failure of the Magnox reprocessing plant. These contingency plans will ensure the safety of any unprocessed Magnox fuel (*i.e.* NDA will be able to meet regulatory requirements), although they do not fully address the associated liabilities (*i.e.* the financial implications). Examples of possible contingency plans include containerisation, or in-reactor storage of unprocessed Magnox.

### ***AGR Fuels***

6. AGR fuels have to be transported to Sellafield whether or not it is eventually reprocessed because the station ponds are relatively small and do not have the capacity to store the lifetime arisings from each station. The original total of irradiated AGR fuel expected to be produced in the UK over the lifetime of the AGR fleet was around 8500 tonnes, although AGR life extensions could increase this to a total of ca 10000 tonnes.

7. The projected THORP end date remains at 2018. THORP lifetime throughput will be ca 10000 tonnes, approximately half of UK origin and half overseas. This is expected to leave between 3500 and 5000 tonnes of unprocessed AGR fuel.

8. Ownership of AGR fuel is split between NDA and EDF Energy. Fuel loaded after 14 January 2005, the date of BE (now subsumed into EDF Energy) restructuring, is owned by

NDA; the ca 6200 tonnes loaded before that date is owned by EDF and approximately 1200 tonnes of this will not be reprocessed in THORP. The spent fuel owned by EDF Energy will be managed alongside the NDA fuel.

9. NDA also plans to use THORP to manage small quantities (tonnes to tens of tonnes) of other materials suitable for reprocessing through THORP. These are mainly irradiated prototype and experimental fuels as well as quantities of fuel debris from post irradiation examination (PIE).

10. NDA is planning spent fuel management at Sellafield, balancing pond capacity with arrivals from stations and THORP reprocessing throughput, providing both an understanding of what assets are needed, and until when, and the basis of contingency plans in case of unforeseen changes. If THORP operates as planned until cessation of reprocessing in 2018, there will be sufficient pond capacity at Sellafield to accommodate the AGR fuel which will require long term storage pending disposal.

### **Plutonium**

11. Government's preferred use of UK Pu is as MOX fuel in new build reactors. However, NDA does not believe the UK will have suitable reactors available for burning MOX fuel until about 2030, and it expects a programme to reuse all of the UK's plutonium would run for 40 to 60 years (*i.e.* to around 2080), followed by interim storage (until maybe 2180) and geological disposal.

12. Besides LWRs, there are other options for the reuse of UK Pu, for example irradiation in CANDU reactors (which NDA sees as a variant of utilisation in MOX), or in other reactor types, such as the PRISM fast reactor promoted by GE-Hitachi.

13. The reuse of UK Pu is therefore a very long term programme, with complex decisions to be made, some outside NDA's control, and influenced by a wide range of both commercial and technical considerations. Since the timescale for Pu utilisation is relatively long, NDA does not favour early decisions or foreclosing options at this point and, since decisions on Pu have potentially major implications, NDA is proceeding with caution.

### **Conclusions**

14. We welcome NDA's candour and willingness to discuss these issues in detail. Our overall impression is that NDA has a clear understanding of its responsibilities with regard to managing spent fuel and nuclear materials, has clear plans for managing these materials, understands the potential perturbations to its plans and is developing appropriate contingency options.

15. Given CoRWM's other commitments in the current year and the relatively small amount of time available for Task 5a in the current year, we propose to schedule the proposed meeting with Sellafield Ltd on spent fuels and nuclear materials until early in the 2014-15 financial year.