Dear Ms. Hillier,

Re: The strategy and arrangements for the long-term safe and secure storage of plutonium

Further to the discussion at the Public Accounts Committee on this subject and the publication of the report, I am pleased to attach the NDA’s response to recommendation seven.

Yours sincerely,

David Peattie
Chief Executive Officer

Enc: The strategy and arrangements for the long-term safe and secure storage of plutonium
THE STRATEGY AND ARRANGEMENTS FOR THE LONG-TERM SAFE AND SECURE STORAGE OF PLUTONIUM

Recommendation: Within six months, the Department should write to the Committee, setting out its plan for deciding on the long-term use of plutonium. The NDA should also write to the Committee explaining fully its contingency arrangements to manage plutonium at the site, and the reasons behind cost escalations and delays.

This response, prepared by the NDA, has been sent alongside BEIS's response to the Committee regarding the development of a long-term disposition solution for the UK's inventory of civil separated plutonium, also covered by Recommendation 7.

It provides more detail to the NDA paper that was published in March 2019 which includes a section on the safe and secure storage of plutonium. This paper can be accessed through the link below.


BACKGROUND

One of the most complex challenges facing the NDA in dealing with the UK's nuclear legacy is the management and, ultimately, disposition of the inventory of separated plutonium held in the UK (ref.1). Due to the size of the plutonium inventory, any long-term disposition solution will take many decades to implement.

In the meantime, the NDA is ensuring the continued safe and secure long-term storage of plutonium at Sellafield by repacking the material for placement in a suite of modern stores, with enhanced resilience measures. This is allowing time to develop and implement the right long-term disposition solution.

Due to the radioactive and fissile nature of the material, plutonium handling and storage requires specialised facilities and stringent management arrangements. The independent Office for Nuclear Regulation (ONR) is responsible for regulating nuclear safety and security across the UK and its inspectors ensure that the site licensee, Sellafield Ltd, meets these stringent requirements.

UNDERPINNING LONG-TERM SAFE AND SECURE STORAGE

The NDA will hold an inventory of around 140 tonnes of separated plutonium by the time reprocessing finishes in 2020. Plutonium produced from Magnox and THORP reprocessing is stored in the form of its oxide powder. Due to its radioactive and hazardous nature, plutonium oxide powder is stored within stainless steel cans, which for reasons of safety are sealed to ensure containment of the material. The inventory also includes materials arising from early reprocessing activities, nuclear fuel development work, R&D activities and manufacturing residues which are stored in a variety of steel packages.

There are a number of plutonium stores on the Sellafield site that store these plutonium cans. Over the past decade, materials have gradually been retrieved from older stores and consolidated in state-of-the-art facilities such as the Sellafield Product and Residue Store (SPRS). The aim is to transfer all NDA-held plutonium into the SPRS store - and its extensions - over the next few decades. To ensure that the plutonium packages can be safely stored in SPRS they will be repackaged and, where appropriate, some plutonium
materials will be treated to be compatible with long-term storage. In some cases treatment is necessary to remove contaminants which can reduce the lifetime of the packages.

A major, new specialised facility to repackage materials is required to support this strategy. Known as the SPRS Retreatment Plant, abbreviated to SRP, this facility will repackage, and where appropriate, re-treat all of the plutonium packages. The plutonium will be packaged in a container suitable for storage for at least one hundred years. Based on current estimates, this facility is expected to become operational in less than ten years and to operate for nearly forty years.

This programme of work for the safe and secure storage of plutonium is summarised in Figure 1, and provides an overview of the plan to gradually remove material from the older stores at Sellafield, repackage them in SRP and transfer to the new store and its extension, SPRS.

The NDA has evaluated the need for the new repackaging plant, SRP, in the context of the long-term plutonium disposition options under development and concluded that, irrespective of which option is chosen, this new capability is required to ensure continued safe and secure storage.

Figure 1 - Overview of the strategy to retrieve plutonium cans from older stores, repackage the materials in SRP and transfer to the new SPRS and its extensions.

MANAGEMENT OF LEGACY PLUTONIUM FACILITIES AND PACKAGES INCLUDING CONTINGENCY ARRANGEMENTS

The first-generation plutonium plants and stores at Sellafield were built in the 1950s to support reprocessing operations. The NDA considers some of the older plutonium facilities used for manufacturing and storage to be amongst the highest hazards on the Sellafield site, comparable with the legacy ponds and silos facilities (ref. 2 and 3). The condition of some of these plutonium facilities and some of the packages held within them is such that urgent action is required to reduce the risk.

A programme of work was instigated to retrieve these materials from the older stores and consolidate them in more modern stores. This is now largely complete. A major programme
of asset care has also been undertaken at these legacy facilities to support operations until they can be taken out of service and decommissioned. Sellafield Ltd has introduced enhanced package inspection programmes and identified categories of containers, largely the oldest ones, which are not suitable for extended storage and should be promptly repackaged.

Due to the requirement to reduce risk, and to ensure their continued safe management, most of these older containers will be repackaged in existing plants. This is the “contingency repack capability” shown in Figure 1. When the new SRP plant becomes available, the contents of these containers will be treated and then repackaged into containers suitable for long-term storage in the modern SPRS store and its extensions. This programme of work is receiving enhanced regulatory oversight, and Sellafield Ltd is working closely with the ONR to complete this work as quickly as possible.

EXPLANATION OF COST ESCALATIONS AND DELAYS

The NDA agrees with the statement in the NAO's report of June 2018 that the costs of the programme to manage the indefinite storage of UK held plutonium are expected to increase between £0.5 – £1 billion from the current estimate of £3.5 billion (undiscounted).

There are three main expected contributors to this increase:

i) Increase in cost of the SRP project (to retreat and repackage plutonium cans) as the project moves from the early definition phase (Concept Design), to the more detailed government-approved Outline Business Case (OBC) based on a Preliminary Design.

ii) Risk that the current baseline costs for the two extensions to SPRS are understated. This is based on the actual costs of the first store completed in 2012, recent learning from the SRP project, and the costs of maintaining appropriate security and safeguards while the future store extensions are constructed.

iii) Operations of the contingency repacking capability to treat the most ‘at risk’ cans over the next several years until SRP becomes available.

The most significant part of the cost increase in the programme is the SRP project, where the P80 project cost was confirmed at £0.9 billion at the Outline Business Case stage. This was approved by BEIS and HMT in October 2018, which was a £0.3 billion increase on the previous estimates the NDA had reviewed in mid-2016. These estimates were before the preliminary design was complete and when the project was at the concept design phase. The Outline Business Case noted that given the lack of recent experience in construction of plutonium handling plants in the UK, the unique nature of the facility globally and early stage of development, it was prudent to apply optimism bias in the overall estimate leading to an upper cost range of £1.5 billion. NDA expects to be able to reduce the overall range when the SRP project brings forward the Full Business Case (FBC) for approval which is currently forecast for 2021. By then, the estimate should benefit from market engagement, appointment of the delivery partners, and completion of detailed design. However, any delays to the appointment of the delivery partners may impact on NDA’s ability to reduce the cost range for SRP by the time the FBC is put forward to UK government for approval in 2021.
References

[1] Nuclear Decommissioning Authority, Strategy, 2016. For our Strategy for Plutonium see part 5.1. For the background on production of plutonium from spent fuel see parts 4.1 Spent Magnox Fuel and 4.2 Spent Oxide Fuel.

[2] David Peattie, Nuclear Decommissioning Authority, Evidence to the Public Accounts Committee, August 2018