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**Bill Esterson MP**  
House of Commons  
London  
SW1A 0AA  
[Sent by email]

6<sup>th</sup> February 2025

CEO(25)-0004

Dear Bill,

**Re: Follow-up to ESNZ Select Committee hearing held on 18<sup>th</sup> December 2024**

Further to the NDA Group's appearance at the ESNZ Select Committee in December, I write to provide additional information in relation to the assumptions underpinning the Geological Disposal Facility (GDF); the outcomes realised from our investment in R&D; and what we have done to improve cost estimation and performance of major projects especially at Sellafield.

**Q1. What are the waste volumes that are expected to be generated from new nuclear based on NESO's latest predictions and can they be accommodated in a GDF?**

The GDF programme has specifically been designed to build in flexibility regarding total capacity / size to take account of changes in anticipated final waste volumes. The current assumption for new nuclear build is 24GW, the last published figure, but will be adjusted if a new figure is published. The final volumes that will be generated are subject to significant uncertainty because relevant factors such as the types of reactors that will be deployed at new build plants, the dates they will come online, and how they are operated, are not yet known. The geology of the GDF and future packaging choices will also affect total volume.

The table below shows projected waste streams based on 16GW of new nuclear build in terms of both volume and activity. We have some early scenario updates for 24GW which will feature in a future publication of the Inventory for Geological Disposal.

Category	% volume as packaged rounded	% activity at 2200 rounded
<b>Legacy</b>		
High Level Waste	1%	5%
Intermediate level waste (inc. uranium)	84%	2%

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Low Level Waste	1%	0%
Spent fuel	2%	10%
Plutonium	0.08%	0.2%
Mixed Oxide spent fuel (Pu stockpile)	2%	13%
<b>New build 16 GW<sub>e</sub></b>		
Intermediate Level Waste	5%	3%
Spent fuel	5%	67%

**Q2. What assumptions were made when the NAO 2022 cost estimate of the GDF was developed, for example was inflation included?**

The cost estimation in the 2019 GDF Programme Business Case is quoted as £20.3bn-£53.3bn. The lower end of the range reflects the whole life cost in 2017/18 money values and the upper end of the range includes the additional costs associated with complex geology, a full inventory, and risk, uncertainty and optimism bias.

In line with HMG Green book rules inflation was not included in these figures or in the NAO 2022 report from which these numbers were taken. Costs for long term projects such as these are always expressed in values from the base year i.e. 2017/18 to better show the change in costs as the distortion from inflation has been removed. The figures will be updated in the revised Programme Business Case due to be submitted by the end of 2025/26.

**Q3. What outcomes does the NDA Group achieve from its investment in R&D, for example through patents?**

The NDA Group's investment in R&D leads to the improved delivery of the decommissioning mission. This is achieved in a variety of ways - through the development of new technologies and techniques to address first-of-a-kind decommissioning challenges, by improving existing technologies and techniques for ongoing decommissioning operations and by developing the next generation of technical subject matter experts. The improvements aim to reduce lifetime cost, enhance health and safety, improve security, accelerate risk and hazard reduction, and minimise environmental impact.

The majority of R&D is funded by the NDA Group but delivered by the supply chain, and who are best placed to exploit and develop innovation. To stimulate innovation, and in common with other Government R&D funding, our Intellectual Property (IP) policy states that the NDA retains ownership of IP (e.g., patents) only in limited areas, for example security. Retaining IP in the supply chain reduces costs associated with procuring R&D and IP ownership, and encourages the supply chain,

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particularly Small and Medium-sized Enterprises, to collaborate with the Group and develop technologies and techniques using non-NDA funding.

While NDA Group owned patents have not been a significant outcome of our investment, supply chain organisations funded by the NDA group have patented their inventions and exploited them in UK and international markets. We do not routinely collect such information but are aware of some case studies including one UK supply chain company who revealed NDA investment of £165k leveraged a further £1.4M in government funding, and their own company investment of £765k yielded a return of over 1000% due to increased turnover and exports.

In 2022, the NDA commissioned an independent review of its strategic R&D portfolio, finding a Benefit: Cost Ratio of between 3.1 and 4.3, which is comparable to other government R&D organisations. A further assessment is planned within the next two years, by which time more of our R&D portfolio will have matured.

#### Q4. Are there examples of how technologies have reduced task completion times?

The application of technologies across the NDA group brings many benefits including a reduction in the time and cost of activities. But it also allows us to access hostile environments that were not previously accessible to humans, or to remove the workforce from hazardous conditions creating a safer working environment. Gaining information on these previously inaccessible environments can help us plan for decommissioning more cost effectively. Examples include:

- **Quadruped Robots:** The application of robots for a decommissioning activity at Sellafield reduced costs of previous approaches by half (£1M to £0.5M) and time by three-quarters (18 months to 4 months). Potential savings across the NDA group are predicted to be over £100M with decades of project time saved. The learning from Sellafield has been shared, and the technology demonstrated at NRS Dounreay and NRS Trawsfynydd.
- **Unmanned Aerial Vehicles (Drones):** The use of drones for external asset inspections instead of scaffolding reduced timescales from four months to several days and costs from £100k to £1.5k for a planned inspection. This could realise savings of up to £100M and decades of reduced project time. Additionally, safety improvements were achieved by removing people from working at height. The use of drones is now being coupled with AI to determine where targeted inspections should occur and automate some activities. This will result in further time and cost savings.
- **Remote Decontamination:** The use of remote high-pressure water jetting allowed a legacy filter within a processing plant to be restored to full functionality, avoiding its replacement and 3.5 years of work developing and installing a replacement system.
- **In Situ Characterisation:** A handheld, compact, lightweight device that combines a gamma-ray spectrometry detector with a small video camera is used in decommissioning to rapidly identify radioactive hotspots within legacy facilities (e.g., gloveboxes). This saves weeks of time per glovebox by avoiding the need for extensive laboratory analysis.

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- **Sensors:** A hydrogen sensor, developed for the oil and gas industry, was used to measure the decay in hydrogen emissions from a waste package. This removed days from the schedule for moving each package, leading to a significant overall reduction in activity.

#### **Q5. How has the NDA group reduced optimism bias in major projects and improved cost estimation?**

Costs for major projects of the nature that Sellafield Limited is typically dealing with that require first of a kind engineering, are notoriously difficult to predict. However, optimism bias was inherent in legacy projects at Sellafield, and a positive step towards improving cost estimation has been the application of Reference Class Forecasting (RCF). RCF uses historic cost and schedule data from Sellafield projects, nuclear projects delivered by other organisations, and other major projects across the UK to provide a more realistic assessment of potential outcomes for projects of similar scale and complexity within challenging, hazardous, and highly regulated environments.

RCF has been implemented across the NDA group from 2020 onwards, and a retrospective exercise on legacy projects at Sellafield confirmed that if RCF had been applied at Strategic Outline Business Case (SOBC) and Full Business Case (FBC) for example on Box Encapsulation Plant and the Box Encapsulation Plant Product Store – Direct Import Facility, it would have resulted in a wider cost envelope with current anticipated lifetime cost forecasts falling within the RCF ranges.

Further, the application of tools has brought more stability to cost and schedule estimates. These include Quantitative Schedule Risk Analysis (QSRA) models which identify the potential impact of uncertainty on the baseline estimate, Project Definition Rating Index (PDRI) which provides a quantitative assessment of the maturity of a project's scope at each of the stage gates and aids understanding of whether the project is ready to proceed; and Opportunity Framing which helps bring clarity of scope, decisions, and stakeholder commitment at the start, and throughout the project life cycle.

#### **Q6. What steps have been taken to improve major project performance at Sellafield?**

Project performance at Sellafield has benefitted from the introduction of a variety of initiatives designed to grow workforce capacity and capability and bring greater expertise, challenge and leadership to project delivery including the introduction of dedicated programme and project Board sub-committees chaired by experts from across industry, and the launch of a new contracting vehicle – the 20-year Programme and Project Partners (PPP) model.

A project and programme management (PPM) excellence programme has been established to build, share and implement industry best practice across the NDA group. The programme has proactively engaged with wider public sectors bodies; professional institutes e.g., the Infrastructure and Projects Authority (IPA) and Construction Industry Institute (CII); and leading EPC organizations (Engineer, Procure, Construct) and introduced new ways of working.

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In 2020 the Portfolio, Programme and Project Delivery (P3D) Improvement Programme (PIP) was launched to enable more effective initiation and delivery of the portfolios, programmes and projects required for the group to realise its strategic objectives and benefits. Major project leadership and performance management arrangements have been revised with the introduction of a Senior Responsible Owner approach; the Portfolio Management Office and Intelligent Client have been merged into an integrated team focused on delivery, performance, and strategy; and a Managing Director to the PPP has been appointed to improve integration and change in the wider PPP leadership to strengthen from a construction delivery performance perspective.

The visibility of performance has also been strengthened with better controls and reporting of major projects introduced the group-wide Integrated Programme Controls (IPC) programme. The recent National Audit Office (NAO) report<sup>1</sup> recognised the improvements in forecasting cost and schedule of major projects at Sellafield, and performance in terms of delivery, noting “Sellafield’s performance on more recent major projects has shown signs of potential improvements. Four of the five projects started since 2018 are slightly behind where they should be at this point, but the work completed has cost less than expected. Additionally, the Infrastructure and Projects Authority has given two of these projects ‘Green’ ratings for each of the last two years.” The report also referenced improvements in performance of legacy projects.

Thank you again for inviting the NDA group to give evidence to the Committee. I hope we can facilitate a visit for you and your members to one of our sites in the near future, and in the meantime if you have any further questions, please do not hesitate to contact me.

Yours sincerely,

**David Peattie, FEng HonFNucl**  
Group Chief Executive Officer  
Nuclear Decommissioning Authority

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<sup>1</sup> [Decommissioning Sellafield: managing risks from the nuclear legacy](#)

