Meeting:	NuLeAF Steering Group, 20 July 2012
Agenda Item:	6
Subject:	Consultation on the Proposed Justification Process for reuse of the UK Civil Plutonium Stockpile
Author:	Stewart Kemp
Purpose:	To propose a response to the consultation

Introduction

This report covers:

- an overview of the Government consultation on the management of the UK civil plutonium stockpile
- a draft response to the consultation
- alternatives to the use of plutonium as MOX fuel

Recommendation

That the Steering Group agree the response to the consultation as outlined in this document, delegating final sign off to the Chair, Vice-Chair and Executive Co-Directors.

Contribution to achieving Strategic Objectives

This report is relevant to Strategic Objective No.3:

"Seek to ensure that proposals for new projects that may be simpler, faster or cheaper than current practices can be convincingly demonstrated to be the best practicable, taking into account a full range of life cycle, safety, environmental and socio-economic factors, and stakeholder views."

1. Management of the UK Civil Plutonium Stockpile

1.1 On 28 May DECC published a consultation document entitled: *Management of the UK's plutonium stocks - a consultation on the proposed justification process for the reuse of plutonium*. The consultation is about the *process* Government should adopt to determine justification of the 'whole MOX path from fabrication through to disposal' i.e. that the benefits of reusing the stockpiled civil plutonium mostly held at Sellafield will outweigh detriments. The consultation is not about the justification per se for the construction of a new MOX fuel fabrication facility. The deadline for consultation responses is 20 August 2012.

1.2 The justification principle is defined in the EURATOM *Basic Safety Standards Directive 96/29* and is derived from International Commission on Radiological Protection guidance. The Directive has been incorporated into UK law by the *Justification of Practices Involving Ionising Radiation Regulations 2004* which requires that any new type or class of practice that involves ionising radiation must by justified by demonstrating that benefits will outweigh detriments. In the UK the "…responsibility for reaching a justification decision in relation to an application concerning the reuse of plutonium is likely to rest with the Secretary of State for Energy and Climate Change."

1.3 Government seeks views on 4 questions:

i Qu1. Because Government is considering two other options for plutonium disposal, other than MOX burning (see para. 3 below), its preferred approach is to produce generic guidance to applicants which, rather than limiting the guidance specifically to the consideration of applications which are for the reuse of Plutonium as MOX, will cover applications from a wide range of reuse technologies. Government asks: "**Do respondents agree with the Government's view that it is sensible to issue generic guidance for the reuse of plutonium?**"

ii Qu2. Government proposes to publish applications for plutonium reuse (redacted as necessary) and take any necessary expert advice before publishing a draft decision document which sets out its assessment of the benefits and detriments of the class or type of practice. Government proposes that it consults the statutory consultees, the Devolved Administrations, relevant Government Departments, the public, and other interested parties as appropriate (e.g. overseas Governments, non-Governmental organisations). Government will then consider all comments made during the consultation period before producing a final decision document for a decision by the Secretary of State for DECC. Government asks: "**Are the proposed application and decision-making processes clear, appropriate and proportionate? If not, how can they be improved?"**

iii Qu3. Government proposes to publish information set out in the attached Tables 2 & 3. It says that it does not intend to be prescriptive, but rather the tables indicate the main information likely to be necessary to enable a clear, high-level assessment of the health detriments and the net economic, social or other benefits associated with the introduction of a plutonium reuse technology. Government proposes that Applicants be

advised to exercise their own judgement on what may be relevant to their application, but are also encouraged to follow Government guidance. Government asks: **"Is the indicative list of information (in Table 3** – *Note DECC appears to mean Table 2***) sufficient and appropriate to assist in the making of justification applications and justification decisions? Does the indicative list omit any relevant information, or include any unnecessary information?"**

iv Qu4. Government asks **"Are there any other ways in which the draft justification process can be improved? If so, how?"**

2. Suggested response from NuLeAF

2.1 No specific comments are proposed to Questions 1 and 2.

2.2 In response to Question 3 it is suggested Applicants should indicate *where* the proposed practice would, or could, take place and that any future justification process would engage with the relevant communities to assess socio-economic and environmental impacts. It is further proposed that where possible the 'MOX path' locations for undertaking specific spent fuel, radioactive waste management and decommissioning activities be identified, and long term geological disposal implications be explained, so that relevant communities can be engaged, understand, and assess the benefits and detriments of these activities.

2.3 Similarly, it is suggested Applicants be asked to disaggregate and identify the distribution of benefits and detriments locally and nationally. Applicants should set out how they would do this.

2.4 In response to Question 4 it is suggested that officers underline the need for any justification process to recognise that impacts will be felt in specific locations and where possible generalisations about costs and benefits should be avoided and area specific assessments undertaken.

3. Alternatives To The Reuse Of Plutonium As MOX Fuel

3.1 On 27 June 2012 NDA issued the following statement:

"On the 23 February 2012 the NDA announced we were seeking proposals on potential alternative approaches for managing the UK's plutonium stocks alongside providing support to the Government as it progresses its preferred policy of converting the material into Mixed Oxide fuel (MOX) for reactors.

We noted we were working with the Government to establish that re-using plutonium as MOX fuel remained the best option and had engaged several parties to provide support in this respect. We also added that we wished to assess whether any other parties were able to propose alternative credible full lifecycle management options.

By the time the deadline for expressions of interest had passed, on the 31 March 2012, we had received 4 responses.

NDA undertook initial discussions with each respondent and considered that there was merit in progressing two of the alternative proposals alongside development of reuse as MOX in Light Water Reactors. Further detailed discussions have taken place and NDA has subsequently engaged General Electric-Hitachi (GEH) and Candu to provide further information regarding their proposals.

The GEH proposal relates to a UK deployment of its PRISM reactor as part of an integral fuel fabrication/reactor plant solution for Plutonium disposition. The engagement is focused on assessing the technical and commercial credibility of the approach, noting that the technology proposed is not currently included in the NDA credible options.

The Candu proposal relates to a UK deployment of its Enhanced CANDU® 6 reactor and associated facilities to provide a solution for Plutonium disposition. The engagement is focused on assessing the commercial credibility of the approach and refreshing and refining technical studies undertaken previously, noting that the technology proposed is currently included in the NDA credible options.

It is anticipated that the work on both proposals agreed at this stage will be concluded later this year. NDA will subsequently assess the information and consider how best to proceed with alternative proposals alongside the preferred option of reuse as MOX."

3.2 0n 9 July GE-Hitachi suggested two PRISM reactors could be built at Sellafield with financial support from the US Export-Import Bank. These reactors could be operational within 10 years and consume the 100+ tonne plutonium stockpile over 5 years, and in so doing generate 600 megawatts of electricity. NDA would be charged an agreed fee for each kilogram of plutonium consumed. Details are contained in a one thousand page feasibility study submitted to the NDA.

TABLE 2 – List of indicative information to be provided

Information Requirement	Guidance
Description of the proposed class or type of practice	Applicants should provide information in the following areas: • A summary of the class or type of practice (or phase of the class or type of practice). • The main technical characteristics of the class or type of practice (and of the phases within the class or type of practice). • Confirmation of whether or not the application is being made under Regulation 9 of the 2004 Regulations (for a decision in relation to a new class or type of practice).
Radiological Health detriments	Applicants should provide information in the following areas: • How the proposed class or type of practice may cause a radiological detriment to human health (including the general public, plant workers, other specific population groups). • Radiological health detriments associated with normal operation and accident conditions. • How design, operation and mitigation strategies will reduce the risk and magnitude of accidental radiological exposures to below regulatory limit. • Any other potential radiological health detriments.
Radioactive waste and decommissioning	Applicants should provide information in the following areas: • How decommissioning, waste management, spent fuel management and disposal would be dealt with. • The nature and volume of radioactive waste and spent fuel that could be expected to be produced at each stage. • The features of the design that will facilitate decommissioning. • Mitigation strategies, regulatory arrangements and related assurance to address detriments and risks. • Any other potential benefits and detriments associated with radioactive waste and decommissioning

Environmental	Applicants should provide information in the following areas: • The total carbon emissions across the full lifecycle of the proposed class or type of practice (compared to the full lifecycle for conventional UOX fuel). • Net contribution to the UK's overall carbon emissions. • Non-radiological effects on people and the environment (water, air, chemicals, light, thermal, noise, landscape animal health, flora, fauna etc.) Throughout construction, operation and decommissioning. • Radiological effects on animal health, flora and fauna. • Normal operation and accident or terrorism related conditions, including management and disposal of waste (radioactive and non-radioactive). • Accident and terrorism mitigation strategies. • Assurance provided against stated risks (including reference to the regulatory regime). • Any other potential environmental benefits and detriments.
Non-proliferation and physical protection (security)	Applicants should provide information in the following areas: • How the proposed class or type of practice will help to mitigate the security and non-proliferation sensitivities associated with long term storage of separated plutonium. • A risk profile showing changes in the security and non-proliferation sensitivities associated with separated plutonium and plutonium baring materials throughout the lifecycle of the class or type of practice. • Any other potential benefits and detriments from a security perspective.
Other benefits and detriments	Applicants should provide information in the following areas: • Non-radiological health detriments in normal/accident conditions (including to the general public, plant workers, other specific population groups). • Contribution to security of supply. • Economic benefits and detriments. • Benefits and detriments to UK jobs and skills. • Benefits and detriments to UK's long-term objectives (for example, impact on Sellafield's Lifetime Plan objectives).

Table 3 – Suggested Phases in the Plutonium Reuse Lifecycle

Stage	Description
Plutonium Retrieval	The retrieval of separated plutonium from stores. To include internal transport of UK-owned separated plutonium from its point of storage to its point of pre-treatment.
Preparation of Separated Plutonium	Any preparatory activities required to make ready the inventory of UK-owned plutonium for fabrication into fuel. To include internal transport of UK-owned separated plutonium from its point of preparation to its point of fabrication into fuel and the decommissioning of facilities associated with preparatory activities.
Fuel Fabrication	The process of taking the prepared separated plutonium and fabricating fuel assemblies from it. To include internal transport of fuel assemblies from their point of manufacture to their point of irradiation and the decommissioning of fabrication facilities.
Fuel Irradiation	The generation of electricity through the irradiation of plutonium baring fuel assemblies in nuclear fission reactors. Should include the internal transport, storage and management of spent plutonium baring fuel and decommissioning of reactors. The Government's response to its consultation on the long-term management of UK owned separated civil plutonium identified that "it would be preferable to have the plutonium put permanently beyond reach via its final disposal in a geological disposal facility (GDF)…", and as such applicants are advised to consider whether spent fuel could be disposed of in a GDF, should one become available.