

Questions and responses to Plutonium issues

September 2012

1. Introduction

The West Cumbria MRWS Partnership raised a number of questions with the Department of Energy and Climate Change (DECC) as a result of the Written Ministerial Statement on Plutonium on 13 July 2012 (see Annex 1). It was proposed that DECC's responses to these questions should be published to address the disquiet that occurred at the Partnership's final meeting on 19 July 2012 (see the Partnership Meeting Report – Document 302, Section 3.4) following further clarification that was provided at that meeting (see Annex 2).

The responses that have been received from DECC are detailed below.

2. Questions and responses

How did the German plutonium come to be at Sellafield and what will now be staying there as a result of the agreement?

Under commercial contracts, some utility companies from other nations sent spent nuclear fuel to the UK for reprocessing at the Thermal Oxide Reprocessing Plant (THORP) in order to separate and recover reusable nuclear materials, in this case plutonium, that could be turned into new fuel for nuclear reactors.

Germany is one of the countries whose utilities sent spent fuel for reprocessing, resulting in them owning plutonium in the UK. German law requires them to reuse plutonium in their ownership. They therefore intend to convert it to mixed oxide (MOX) fuel for reuse in their nuclear reactors while German reactors are still available ahead of the planned reactor shut down programme. The Sellafield MOX plant has been unable to provide this conversion to MOX in the UK, however, a facility is available in France that can make MOX in the timeframe required for re-use in German reactors. To avoid the need to transport German plutonium to France an alternative solution was agreed that involved the NDA and Germany utilities swapping ownership of an amount of plutonium. This swap agreement was a commercial matter and was agreed by Euratom. The swap process works by the German utilities taking ownership to an equivalent amount of plutonium in France to that which they owned in the UK. At the same time, the NDA takes ownership of the amount of plutonium in the UK that was previously under the German utility ownership. The amount of plutonium in the UK remains the same. To answer the

specific question of what will be remaining here, the answer is plutonium produced by reprocessing activities at THORP and now owned by NDA.

The HLW produced from the reprocessing of German spent fuel will be sent back to Germany under the ongoing Vitrified Residue Return (VRR) programme as per UK Government Policy. (See <http://www.nda.gov.uk/news/vvrprogramme.cfm> and <http://www.nda.gov.uk/stakeholders/newsletter/high-level-waste-returned-overseas.cfm> for more detail.)

Why did the Government decide to take title / ownership of this plutonium?

The Government agreed to the Nuclear Decommissioning Authority (NDA) undertaking these swaps and taking title to this plutonium because in this case taking ownership offers a commercially advantageous solution which also removes the need to physically transport this separated plutonium, with the associated significant security measures, to France in order for it to be manufactured into MOX fuel for the German utilities and allows NDA to meet its contractual requirements. The high level waste (HLW) from reprocessing the original German spent fuel will still be returned to Germany from Sellafield.

What other (and how much) overseas plutonium is held at Sellafield and is it possible that the UK will take now take title to any of this?

Information about holdings of civil plutonium in the UK can be found on the Health and Safety Executive website (see <http://www.hse.gov.uk/nuclear/safeguards/civilplut11.htm>).

The UK currently holds 118 tonnes of civil plutonium, mostly at Sellafield, of which around 24 tonnes is now owned by foreign utility companies.

The UK Government's preferred policy on long-term management of the UK's plutonium is that it should be reused as MOX fuel. This policy provides an option whereby overseas customers could opt to have their plutonium converted into MOX fuel in the UK in the facilities that will be used to convert UK-owned plutonium into MOX, if it suited their requirements.

In addition, subject to compliance with inter-governmental agreements and commercial arrangements that are acceptable to UK Government, the UK is prepared to take ownership of overseas plutonium stored in the UK after which it would be treated in line with this policy.

Operators of future UK new build reactors will have to source fuel for these and if UK MOX development proceeds then it would be open to them to use MOX fuel as part of the mix.

The possibility of overseas plutonium in the UK transferring to UK ownership was acknowledged in Chapter 6 of the Consultation Response on Plutonium Management, which sets out more detail on this. (See Chapter 6 in the Government's consultation response for more details

<http://www.decc.gov.uk/assets/decc/Consultations/plutonium-stocks/3694-govt-resp-mgmt-of-uk-plutonium-stocks.pdf> .)

Will the Government buy stocks of plutonium that are currently in other countries?

No. There is no intention of the UK acquiring plutonium that is currently in other countries.

What waste streams could arise from burning German plutonium via the alternative methods now being considered by NDA and what would that add to the existing UK higher activity waste inventory? What additional GDF capacity requirements would arise from this?

The UK Government's preferred policy on long-term management of the UK's plutonium is that it should be reused as MOX fuel.

When plutonium is converted to MOX fuel and used in a nuclear reactor, this replaces an equivalent amount of traditional uranium oxide fuel that would otherwise have been used in the reactor. In all cases, spent fuel results. Spent MOX is known to be hotter than existing spent oxide fuel and so may require longer cooling prior to disposal, however, new build operators are expected to use higher burn-up rates for their uranium oxide fuel, meaning this would also be hotter and potentially require longer cooling anyway. NDA is investigating how "hotter" spent fuels should best be managed.

Whilst the MOX option is the most technologically mature and accessible option, the NDA has engaged General Electric-Hitachi (GEH) and Candu to provide further information regarding their proposals on alternatives to MOX, but this work is at an early stage. Clearly Government and NDA would not look to deploy an alternative option to MOX if it was not shown to be advantageous to do so. (See <http://www.nda.gov.uk/news/plutonium-management-alternatives.cfm> for more information.)

How might such wastes impact on the safety case for a GDF?

There will be no impact on a safety case for a GDF. The characteristics of the plutonium that came to NDA ownership through swaps are exactly the same as other UK owned plutonium from THORP reprocessing and the Government's preferred policy for plutonium management remains re-use as MOX fuel.

Is it correct to say that the Government's current position is that it is considering converting plutonium to MOX and burn it, extracting the energy value, but mainly to convert it to a spent fuel for direct disposal to a GDF?

The UK Government's preferred policy on long-term management of the UK's plutonium is that it should be reused as MOX fuel, extracting the energy value and creating a disposable, irradiated spent fuel. (See Chapter 5 in the consultation response document <http://www.decc.gov.uk/assets/decc/Consultations/plutonium-stocks/3694-govt-resp-mgmt-of-uk-plutonium-stocks.pdf> for more details.)

If it isn't reused in a potential 'reuse programme', would it go into the GDF?

The Government must be confident that its preferred option, that is reuse of plutonium as MOX fuel, could be implemented safely and securely, and that it is affordable, deliverable, and offers value for money. Only when the Government is in this position will it proceed with a new MOX plant. If Government cannot establish a means of implementation that satisfies these conditions then the way forward may need to be revised.

How much is the UK Government being paid to take title of the German plutonium? How was this price calculated?

The NDA have taken title to this material and this is a commercial matter for the NDA and its customers. There are also non financial benefits associated with the swaps, including having national control over how we manage more of the civil plutonium already in the UK and avoiding the additional security burden associated with plutonium transports.

How is the decision to take title of this plutonium consistent with the UK Government's presumption of not taking overseas waste except via substitution?

Plutonium is not a waste. It is a re-usable nuclear material extracted from spent fuel via reprocessing for potential use in new fuel. As stated above, Government's preferred policy on long-term management of the UK's plutonium is that it should be reused as MOX fuel.

Does the agreement with Germany mean that the high level waste that would come from reprocessing the spent fuel would be returned to Germany?

Plutonium and high level waste (HLW) are extracted from the reprocessing of spent nuclear fuel. The HLW that was separated from reprocessing the original German spent fuel will be returned to Germany under the ongoing Vitrified Residue Return (VRR) programme in line with UK Government policy. (See <http://www.nda.gov.uk/news/vvrprogramme.cfm> and <http://www.nda.gov.uk/stakeholders/newsletter/high-level-waste-returned-overseas.cfm> for more detail.)

Is there any provision in the agreement with Germany that if the Government eventually decides not to go ahead with converting this plutonium to MOX and burning it that it can be returned to Germany?

No. The commercial agreements that have been agreed between the NDA, German utilities and Areva have:

- (i) made available plutonium in France to which the German utilities have taken title; and
- (ii) transferred title to NDA of the plutonium already located in the UK that was previously ascribed to the German utilities.

The German utilities now have the plutonium they are contractually due in France, which will be converted to MOX fuel and burned in German reactors.

In this context, it would be preferable to have the plutonium put permanently beyond reach via its final disposal in a geological disposal facility, either directly as a waste in an immobilised form or after its reuse as MOX fuel.

Annex 1 - Written Ministerial Statement (WMS)

Charles Hendry MP, Minister Of State For Energy

13 July 2012

In December 2011 the Department of Energy and Climate Change (DECC) published its consultation response document on Plutonium Management.

The consultation response document set out Government's preferred policy on plutonium management as reuse of plutonium as mixed oxide fuel (MOX) noting that while Government believes it has sufficient information to set out a direction, it is not yet sufficient to make a specific decision to proceed with procuring a new MOX plant, and that if we cannot establish a satisfactory means of implementation then the way forward may need to be revised.

In addition the Government said that overseas owners of plutonium stored in the UK could, subject to commercial terms that are acceptable to the UK Government, have that plutonium managed in line with UK plutonium and in addition, subject to compliance with inter-governmental agreements and acceptable commercial arrangements the UK is prepared to take ownership of overseas plutonium stored in the UK after which it would be treated in line with UK owned plutonium. The Government considers that there are advantages to having national control over more of the civil plutonium that is in the UK allowing us greater influence over how we ultimately manage it.

The Department of Energy and Climate Change has agreed to the Nuclear Decommissioning Authority (NDA) participating in a series of swaps of plutonium material which will result in the NDA taking ownership of around 4 tonnes of plutonium stored in the UK previously owned by certain German utilities. Some of this plutonium was subject to contract for manufacturing MOX fuel in the now closed Sellafield MOX Plant.

This transaction, which has been endorsed by the Euratom Supply Agency, will not result in any new plutonium being brought into the UK and will not therefore increase the overall amount of plutonium in the UK, but will enable a net reduction in the total amount of separated plutonium stored in Europe.

The commercial agreements between the NDA, German utilities and Areva will (i) make available plutonium in France to which the German utilities will take title and (ii) transfer title to NDA of the plutonium currently ascribed to the German Utilities at Sellafield. This will result in German utilities' plutonium being available in France for manufacture into MOX fuel by Areva without undertaking a physical shipment.

We agreed to this transaction since, in this case, taking ownership offers a commercially advantageous arrangement which enables the German utilities to receive MOX fuel and removes the need to transport this separated plutonium to France. Transporting separated plutonium is a complex operation that carries significant associated security obligations that require careful management. Whilst the UK has significant expertise in transporting this category of material, avoiding such shipments and the associated security measures is desirable if there is an acceptable alternative solution to shipping. The financial benefits to the UK of taking ownership are considered to be sufficient to offset the estimated long term cost of managing that plutonium in the UK. It will also enable MOX fuel to be provided to German utilities ahead of the German national reactor shut down programme. This places end dates on German reactor operations and therefore their capacity to use MOX fuel.

The UK has committed to publish annual figures for national holdings of civil plutonium at the end of each calendar year to improve transparency and public confidence. The most recent data can be found on the [HSE website](#).

This data will be updated in due course to reflect the change brought about by the UK taking ownership of the German plutonium.

Annex 2 - Statement given to the Partnership meeting 19 July 2012

We currently have 118 tonnes of plutonium in the UK to be managed. We have set out policy for future management of this plutonium and said that overseas-owned plutonium can be managed in the same way as UK-owned plutonium (by future MOX production). 28 tonnes was owned by overseas companies.

With regard to the recently published Written Ministerial Statement on the management of overseas owned plutonium in the UK (see http://www.decc.gov.uk/en/content/cms/news/wms_plut_ger/wms_plut_ger.aspx), we have made a contractual change to make 4 tonnes of German-owned plutonium available to them in France so that it can be physically supplied as MOX from the existing French plant rather than shipping separated plutonium from the UK.

The end result is that we still have 118 tonnes of plutonium in the UK with the same intention of re-use through future MOX production. 4 tonnes of it now has a different ownership (UK) and is available for us to use in future UK MOX fuel. The Germans have MOX fuel available to them for use in reactors now, before they are closed.

Reusing the plutonium as MOX avoids the need for direct disposal into a geological disposal facility and therefore having control over an additional 4 tonnes of plutonium in the UK will have little impact on the managing radioactive waste safely process.