



Department
of Energy &
Climate Change

Consultation on the management of overseas origin nuclear fuels held in the UK

03 March 2014

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General information

Purpose of this consultation

This consultation sets out proposals which would allow the NDA to manage by means of interim storage and disposal any small quantities of overseas origin oxide fuels that are either not economic to reprocess or cannot be reprocessed in THORP before it closes in 2018.

This approach would permit the NDA to close out the remaining overseas contracts in a cost-effective and timely way, providing more certainty over the future plans for THORP and for the future decommissioning of the Dounreay licensed site.

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Consultation reference: URN 14D/010 – Consultation on the Management of Overseas Origin Nuclear Fuels Held in the UK

Territorial extent:

This consultation relates to England, Wales, Scotland and Northern Ireland.

How to respond:

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

When responding please state whether you are responding as an individual or representing the views of an organisation. If responding on behalf of an organisation, please make it clear who the organisation represents and, where applicable, how the views of members were assembled.

Electronic responses should be emailed to overseas.fuels@decc.gsi.gov.uk, hardcopy responses should be sent to the address given above.

Additional copies:

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We will summarise all responses and place this summary on our website at https://www.gov.uk/government/publications?keywords=&publication_filter_option=consultations&topics%5B%5D=all&departments%5B%5D=department-of-energy-climate-change&official_document_status=all&world_locations%5B%5D=all&from_date=&to_date=&commit=Refresh+results

This summary will include a list of names or organisations that responded but not people's personal names, addresses or other contact details.

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This consultation has been carried out in accordance with the Government's Consultation principles, which can be found here:

<https://www.gov.uk/government/publications/consultation-principles-guidance>

If you have any complaints about the consultation process (as opposed to comments about the issues which are the subject of the consultation) please address them to:

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Executive Summary

This is about enabling the Nuclear Decommissioning Authority (NDA) to manage the remaining overseas origin fuels held in the UK.

This consultation sets out proposals which would allow the NDA to manage by means of interim storage pending disposal, small quantities of overseas origin nuclear fuels that are either not economic to reprocess in THORP before it closes or are no longer able to be reprocessed. This approach would permit the NDA to close out the remaining overseas contracts in a cost-effective and timely way providing more certainty over the future plans for THORP and for the future decommissioning of the Dounreay licensed site.

These overseas origin nuclear fuels were sent to the UK for reprocessing at Sellafield in THORP, or for processing at Dounreay under commercial contracts, with either BNFL or the UKAEA. All of the original contracts date back to the 1970s and 1980s, when the provision of these spent fuel services to overseas customers was a profitable export market for the UK and received strong Government backing. Since these contracts were signed, the international nuclear landscape has changed considerably and, with the passage of time, the required facilities have either closed or, without significant infrastructure investment, will soon reach the end of their useable life.

The vast majority of the overseas nuclear fuels that came to the UK have already been processed in facilities at Sellafield or Dounreay; the reusable nuclear materials have been recovered and the remaining waste has or is planned to be repatriated in an immobilised form suitable for disposal. The recovered plutonium is being safely and securely stored pending agreement with its owners on its future management.

However, managing all of the overseas origin fuels still outstanding by processing through THORP or Dounreay facilities may no longer be the most practical way to deal with them and in some cases might no longer be possible.

For these reasons, in a limited number of cases, the NDA would like to manage relatively small quantities of remaining fuel by means of interim storage pending disposal, taking ownership of the fuels where necessary. This option would be used where the option of reprocessing is no longer available, practical or economic to deploy.

To ensure that the UK does not become a net importer of nuclear waste as a consequence of this, rather than physical reprocessing the NDA will enact “virtual reprocessing”. With “virtual reprocessing” the NDA proposes that a radiologically equivalent amount of waste will be allocated and then returned to the customer as if the fuel has been reprocessed. Additionally, an equivalent amount of nuclear materials will be allocated to the customer and stored pending agreement on their future management. In a small number of cases the amounts of allocated waste are so small that it is neither practical nor cost-effective to return waste to the customer.

At the time Government policy around reprocessing services for overseas customers was formulated it was assumed that all the nuclear fuel that came to the UK could and would be reprocessed. The NDA’s proposal to employ interim storage and to enact “virtual reprocessing”

to manage relatively small quantities of overseas origin nuclear fuels was therefore never envisaged though the Government notes that using such an option does not contravene any obligations to comply with national or EU legislation.

Government is minded to agree that the NDA can, where necessary, close out remaining overseas reprocessing / processing contracts as set out above.

Such an approach will ensure these remaining contracts will be managed cost effectively, which will benefit the UK taxpayer and afford more certainty over the future plans for THORP and for the future decommissioning of Dounreay licensed site.

It should be noted that the site licence companies, on NDA's behalf, must manage the fuel throughout its life in line with Regulatory requirements. The management of any overseas origin nuclear fuels will at all times have to meet all of the necessary safety, security and environmental requirements through formal regulatory approval, regardless of the option ultimately selected for their management.

This consultation also satisfies previous commitments regarding the management of some fuels by advanced allocation, where we made it clear that, if for some reason these fuels could not be reprocessed in THORP, then we would consult publicly before a decision was taken to implement alternative options.

With this paper we are seeking views on possible consequences which Government might not have anticipated and whether there are significant factors that we might have overlooked that would influence our decision on whether or not to support the NDA's request.

Main document

Chapter 1. Introduction.

1. During the mid to late twentieth century the UK had an extensive nuclear power development programme. In support of this programme, facilities for the reprocessing of spent fuels were built at Sellafield to support commercial power reactors and at Dounreay to support the fast and materials test reactors.
2. In addition to domestic customers, the facilities at Sellafield (especially the THORP plant) and Dounreay provided reprocessing and other fuel and materials processing services to overseas customers under contract. These customers included energy utilities, that wanted large scale commercial reprocessing of civil spent fuels, and typically research organisations that required niche services in support of overseas nuclear power development programmes.
3. After it was formed, the NDA inherited from BNFL and UKAEA a number of outstanding nuclear fuel management contracts for services with overseas customers and the responsibility to conclude these in the most effective way.
4. Many of the contracts that covered these services date back to the 1970s and 1980s. At that time the provision of these spent fuel and nuclear materials management services to overseas customers was a profitable export market for the UK and received strong Government backing.
5. The international nuclear landscape has changed considerably since these contracts were signed and facilities that were to be used to treat these spent fuels and materials, to recover the useful nuclear materials, have either been closed or are heading towards the end of their economically viable life.
6. Nonetheless THORP has completed nearly 95 percent of its overseas order book with only about 300¹ tonnes of overseas origin fuels remaining to be managed before THORP is expected to close in late 2018. The rationale behind this expected close date is set out in the NDA's Oxide Fuels Credible Options paper of November 2011². The Credible Options paper set out the possible options for the future of reprocessing at THORP and identified the need to procure replacement highly active storage tanks (HASTs), required to handle the highly active wastes produced by reprocessing, at a capital cost of nearly £500M, should THORP continue to operate significantly beyond 2018. This paper also identified the potential requirement to find an alternative to reprocessing for some small residual quantities of overseas fuels in order to avoid having to operate THORP beyond 2018. Having considered

¹ The majority of this remaining 300 tonnes of overseas origin spent fuel have been subject to Advance Allocation. The circumstances and meaning of Advance Allocation are detailed in Appendix 1.

² <http://www.nda.gov.uk/documents/upload/Oxide-Fuels-Credible-Options-November-2011.pdf>

the possible options, the option to complete the reprocessing contracts and close THORP in 2018 was confirmed and this is set out in the NDA's Oxide Fuels Preferred Option paper of June 2012³.

7. Whilst there remain a number of performance risks that could impact on the delivery of the strategy the NDA expects to be able to reprocess the great majority of the remaining 300 tonnes of overseas origin nuclear fuel as originally intended. However, a residual 30 tonnes of this fuel (out of the original 5000 tonnes overseas order book) is made up of small amounts of prototype fuels, experimental fuels, MOX fuels and some materials leftover from research programmes to substantiate the in-reactor performance of irradiated fuels, which would be challenging to deal with, through reprocessing, before the planned closure of THORP in 2018. Reprocessing, therefore, might not be the most appropriate or practical way to manage these residual fuels and in some cases it is simply not credible. Practical in this sense meaning that it would not be practical to renew or refurbish reprocessing facilities to keep them operating beyond their useable life in order to deal with residual amounts of overseas fuels.
8. The 30 tonnes of residual fuel also includes roughly two tonnes of overseas-origin fuel currently held at Dounreay which will be transferred to Sellafield for future management, alongside similar UK-owned materials, in line with NDA's published strategy for Exotics fuels.
9. The NDA would like to assess and, if appropriate, manage these residual nuclear fuels by means of interim storage pending disposal, taking ownership where necessary. To ensure that the UK does not become a net importer of nuclear waste as a consequence of this, the NDA will enact "virtual reprocessing". With "virtual reprocessing" the NDA proposes that a radiologically equivalent amount of waste will be allocated and then returned to the customer as if the fuel has been reprocessed. Additionally, an equivalent amount of nuclear materials will be allocated to the customer and stored pending agreement on their future management. In a small number of cases the amounts of allocated waste are so small that it will be neither practical nor cost-effective to return waste to the customer. There are also a small number of cases where the contracts for the processing service do not provide for waste returns, primarily those relating to processing of un-irradiated fuels. In these circumstances the NDA would take title to them and manage them alongside their existing similar fuels.
10. This consultation is therefore about considering the policy framework to effectively manage, through interim storage, the residual overseas-origin fuels that are potentially uneconomic to reprocess in THORP or for which no suitable processing facilities exist either at Dounreay⁴ or Sellafield.

³ <http://www.nda.gov.uk/documents/upload/Oxide-Fuels-Preferred-Options-June-2012.pdf>

⁴ To support the clean-up and decommissioning of the Dounreay licensed site the NDA needs to close out the outstanding sixteen overseas legacy fuel contracts at this site. The options for dealing with these materials are extremely limited as there is no suitable facility elsewhere for completing the contracts as originally envisaged.

11. Currently, Government policy requires NDA to reprocess the vast majority of these fuels in THORP and to seek agreement if they propose any changes to the management of them, (see chapter 3). We are minded to agree that the NDA can use interim storage and virtual reprocessing to close out the remaining overseas reprocessing / processing contracts from Sellafield and Dounreay, where to do so would be more practical, cost effective and appropriate and support completion of the THORP reprocessing programme.
12. NDA would however, on a case-by-case basis, need to:
 - a. seek settlement with customers (in a small number of cases where the NDA does not already have title to the fuel);
 - b. ensure the physical and technical capability to implement an option is feasible through its site licence companies; and
 - c. comply with safety, security and environmental requirements, through regulatory approval to implement this option.
13. Clear policy-level agreement by Government is required ahead of regulatory considerations as it will avoid regulatory authorities being asked to consider management options for which Government policy is not clear.
14. Overall this approach for dealing with the remaining overseas origin contracts will, by avoiding the need to replace supporting HASTs, at significant costs, be beneficial to the UK taxpayer and afford more certainty over the future plans for THORP and for the future decommissioning of Dounreay licensed site.
15. This consultation also satisfies previous commitments regarding the management of some fuels by advanced allocation – see Appendix 1, where we made it clear that if, for some reason, these fuels could not be reprocessed in THORP then we would consult publicly before a decision was taken to implement alternative options.
16. Further detail on the background and history of the spent fuels contracted for reprocessing in THORP or at Dounreay is provided in Appendix 1.

Chapter 2. Managing the remaining fuels that came from overseas

17. Agreeing with the NDA's proposal will provide an additional route for managing the remaining overseas fuels. NDA would then be able to determine whether or not to :

- **Process in THORP and allocate customers products and wastes in-line with contractual commitments.** This is the existing NDA's strategy, reflected in its plans, for the vast majority of fuels; or
- **Place the fuels into interim storage⁵,** alongside other NDA-owned spent oxide fuels pending disposal in a Geological Disposal Facility (GDF). NDA would, where necessary, take ownership and close out the contracts through virtual reprocessing.

18. On a case-by-case basis, the NDA (with the support of the relevant site licence company) will assess which of the two possible routes is the most appropriate for managing each of the overseas fuels. The NDA's decision-making and options assessment will be subject to a standard business case approach which will cover the following criteria:

- Government Policy – the option is in-line with Government policy on the management of spent fuels. Further discussion on this is provided in Chapter 3;
- Contract or ownership – where appropriate the NDA has the agreement of the customer for the fuel under the contract or has taken title to the fuel;
- Physical and technical capability - the NDA has a sound basis for implementing the alternative management option i.e. it is viable;
- Regulatory requirements including safety, security, transport and environmental considerations. Any alternative option for the management of these spent fuels must be in compliance with relevant Regulatory requirements in these areas; and
- Cost and relevant criteria from the NDA's Value Framework – the option represents a cost-effective solution compared with the alternatives.

19. It is worth noting that a third route involving transporting the fuel to overseas reprocessing facilities was considered but then rejected for the following reasons:

- Transporting spent fuels overseas for reprocessing would be likely to incur greater costs than managing them in the UK. This is because the NDA would incur costs building facilities at THORP required to remove the spent fuels and to package them for transport (export facilities), costs to transport the spent fuels overseas, costs to reprocess and costs to return plutonium, uranium and waste back to the UK; and
- Some of the fuels have been subject to examination and handling many years ago and have been packaged in ways only to enable their storage pending reprocessing. Further characterisation work or repackaging may be required if these materials were to be transported overseas for reprocessing and such work might reveal that some fuels are not suitable for transportation overseas.

⁵ In a small number of cases this may mean the NDA taking title to the fuel. In the vast majority of cases the fuels have already been subject to Advance Allocation, see Chapter 3 and Appendix 1, which means title already resides with the UK.

Chapter 3. UK Government policy⁶.

20. Government policy on THORP and the management of overseas-origin fuels is set out in the White Paper 'Managing the Nuclear Legacy'⁷, the Energy Act of 2004⁸ and directions made by the Secretary of State under that Act.
21. It says that "*THORP will therefore continue to operate until existing contracts have been completed or the plant is no longer economic*". This policy statement commits the NDA to complete the reprocessing contracts in THORP. Any change or variation in contract requires the approval of the Secretary of State.
22. The NDA considers that it may not be possible to reprocess all of the remaining overseas-origin fuels without the risk of significantly extending the end date for THORP beyond 2018. Operating THORP beyond 2018 solely to manage these residual amounts of spent fuel would be uneconomic and therefore, not the best use of taxpayers' money. In these circumstances it would bring into consideration the conditional part of our policy on THORP, i.e. that "*it will continue to operate until it is no longer economic*", meaning more cost-effective options would have to be considered. Moreover for the overseas fuels at Dounreay, the facilities which would have reprocessed these fuels have already shut down meaning processing is no longer available.
23. Therefore the NDA has sought clarification from Government regarding the policy that covers this area, and the approach in respect of interim storage and virtual reprocessing route.
24. The policy covering the import of spent fuel for reprocessing is set out in the Review of Radioactive Waste Policy, Final Conclusions (CM 2919) 1995. It says that "the question of whether to reprocess, and if so when, is a matter for the owner of the spent fuel" and that "spent fuel should not be categorised as waste while the option of reprocessing it remained open". Elsewhere it notes that "radioactive waste should not be imported to or exported from the UK except for the recovery of reusable materials". It also says that "where such processes would materially add to the wastes needing to be disposed of in the UK, the presumption should be that they will be returned to the country of origin".
25. Interim storage pending disposal will for the majority of the remaining spent fuels be supported with virtual reprocessing to close out the contracts and ensure that there is no net gain in the overall waste being managed in the UK.

⁶ Management of radioactive waste is a devolved matter and therefore in relation to Scotland, it is for the Scottish Government to determine. However, for clarity, the policy for the management of spent fuels and nuclear materials, including matters related to their safe and secure storage, is a reserved matter and is for the UK Government to determine. The Scottish Government published policy for the management of higher activity wastes specifically excludes fuels and nuclear materials.

⁷ Managing the Nuclear Legacy – A strategy for Action, Cm 5552, July 2002
<http://webarchive.nationalarchives.gov.uk/+/http://www.dti.gov.uk/nuclearcleanup/ach/whitepaper.pdf>

⁸ ENERGY ACT 2004: Directions to the Nuclear Decommissioning Authority (the NDA) in respect of the Sellafield Nuclear Site

26. Interim storage also allows for the possibility of taking ownership of small quantities of overseas fuels that can no longer be processed. In this case there may be small quantities of associated waste (a few tens of kilogrammes) – set out further in chapter 4 - that could remain in the UK, as a result taking ownership rather than processing as originally planned. These totals are small enough that retaining them in the UK will not materially add to the overall wastes to be disposed of in the UK. Therefore Government considers that this is in line with CM2919.

Chapter 4. Factors the Government has considered in coming to a preliminary view.

27. The Government has considered the NDA proposals and taken into account a number of factors in coming to a preliminary view.

The quantities of nuclear waste, nuclear materials and spent fuel in the UK

28. The Government notes that the materials in question (~30 tonnes) represent a very small part of the total overseas reprocessing completed in THORP and about 0.3% of the total THORP order book. For clarity a small amount of these fuels are un-irradiated and therefore are not subject to the spent fuel policy requirement for return of operational wastes, with this in mind, the clear expectation is that all but a few tens of kilograms of waste will be returned to the original customer.

29. In the main, the spent fuels in question have already been Advance Allocated. This means that the NDA already owns these spent fuels, having previously swapped, with the customer, an equivalent amount of products (uranium and plutonium) and wastes with that contained in the spent fuel⁹. The majority of the plutonium has been dealt with through title swaps and the waste has or is scheduled to be returned. The uranium has or will be returned to customers. Virtually reprocessing such material, rather than physically reprocessing it, does not change the overall net balance in terms of radiological equivalence between what ultimately remains in the UK and what is returned overseas, it is only the physical form of what remains in the UK that will change.

30. The Government also notes that the additional amount of overseas-origin spent fuel to be interim stored pending disposal is very small compared with the amounts of spent fuel that the NDA owns¹⁰ and which will also be interim stored pending disposal. This additional overseas origin spent fuel does not materially add to the overall amounts of spent fuel that NDA manages, nor does significantly increase the challenge of doing so.

31. Following the criteria set out in paragraph 18, the NDA will return products and waste to customers under the terms of the relevant contracts. In a small number of cases, where the quantities of material which would have had to been returned under the terms of the contract are small, or where the contracts do not include the return of waste / materials or if it would be uneconomic to return wastes, then commercial settlements will be concluded potentially without the return of products or waste¹¹.

⁹ Small amounts of the remaining fuel was imported into the UK nearly 50 years ago and there is no requirement to return products or wastes associated with the management of these fuels. The terms of these contracts were agreed before policy requirements on the import of fuels for reprocessing necessitated the return of wastes

¹⁰ The NDA estimates that depending on how long the UK's AGR fleet operates there may be 3,000 to 5,000 tHM of AGR spent fuel to be committed to long-term storage at Sellafield. Storing up to about 30 tHM of overseas origin spent fuel, instead of reprocessing will give rise to an increase of less than 1% of spent fuel to be stored at Sellafield.

¹¹ In some cases the quantities of waste that would be allocated to customers are very small, in the order of tens of kg, such that it does not make economic sense to prepare, package and transport these to the customer. Moreover, the addition of these

The technical and safety basis for managing these fuels

32. If the NDA were required to reprocess the fuels in question, it might extend THORP operations beyond the planned close date. This is because they are potentially more challenging to reprocess than standard fuels as (i) they are technically difficult to reprocess due to their high levels of fissile material enrichment; or (ii) they are difficult to prepare for reprocessing as they are of a non-standard configuration or dimension, insufficiently characterised or of small volumes that would make campaigning alongside bulk fuels difficult. This does not mean that they *cannot* be reprocessed in THORP only that it could take a disproportionate amount of effort, time and cost to reprocess them.
33. Assessments by Sellafield Ltd and RWMD, on behalf of the NDA, have shown that the overseas-origin fuels share many common characteristics with other NDA oxide fuels and that they can be stored and then packaged for disposal in much the same way¹². Accordingly, the NDA and its estate have developed plans that could be used for the interim storage and management of these spent fuel alongside UK-owned fuels.
34. The difficulties associated with reprocessing some of these fuels could be significant enough that not reprocessing leads to reduced operational challenge. This however would have to be considered against the potential challenge of managing spent fuel by storage, however as noted above, work has been done to show that a storage option is deliverable. It should be emphasised that all options will be subject to Regulatory requirements.
35. The Dounreay fuels have similar physical properties to other NDA owned oxide fuels already at Sellafield under safe and secure storage. The NDA proposes to manage these fuels alongside other oxide fuels and nuclear materials at Sellafield in line with its recently published strategy for the management of Exotics fuels¹³.

The impact on the environment

36. The NDA considers that interim storage, with contracts managed by virtual reprocessing is largely neutral in terms of environmental impact. The fuels in question will be stored alongside other fuels owned by the NDA in the THORP pond resulting in a negligible additional environmental burden.

wastes to the UK inventory represents an almost negligible increase. In some cases where the contract was for the treatment of nuclear materials no operational wastes have been produced meaning there is no requirement to return any waste.

¹² The NDA also holds a diverse range of UK-owned experimental and prototype fuels. Some of these fuels contain fissile enrichment levels much greater than these overseas fuels. Solutions developed to manage these UK-owned materials will also be appropriate to manage the overseas-fuel subject to this Consultation.

¹³ <http://www.nda.gov.uk/documents/upload/Exotic-Fuels-and-Nuclear-Materials-Dounreay-Preferred-Options-February-2013.pdf>

The impact on NDA's resources to deliver decommissioning and clean-up

37. The Government accepts that if the NDA was required to keep operating THORP solely to manage small amounts of spent fuels then it would be an inefficient use of resources and would potentially divert resources from the major clean-up and decommissioning projects at Sellafield.

Chapter 5. Summary of Government's preliminary view.

38. The Government set-up up the NDA to deliver the decommissioning and clean-up of the UK's civil nuclear legacy in a safe and cost-effective manner. NDA's work is complex and challenging and it is therefore important that Government provides the necessary support to enable the NDA to deliver its mission.

39. For this reason DECC is presently minded to agree the NDA's proposal for interim storage with virtual reprocessing which will allow them to close out all of the remaining overseas reprocessing / processing contracts in a timely and cost-effective way, a concept which was not envisaged by the existing policy concerning spent fuel and waste management set out in CM2919 (review of Radioactive Policy, Final Conclusions).

40. The Government considers that it is right for the NDA to assess, and if appropriate, implement alternative options for the management of overseas-origin fuels if this will secure best value for the UK taxpayer. This is particularly relevant for the Dounreay contracts as in some cases no facilities exist in the UK to process these fuels and materials.

41. In relation to the overseas contracts at THORP, Government believes that the NDA's approach is in-line with our policy on operating THORP, spent fuel management and waste. Our reasons for this are:

- These options will allow THORP to close in late 2018 when the vast majority of the reprocessing contracts are expected to have been completed;
- It will support the NDA's early decommissioning programme at Dounreay through consolidation of fuels at Sellafield in line with their recently published strategy¹⁴;
- For the majority of the fuels under consideration, products and wastes have already been or will still be allocated to customers as appropriate, in which case interim storage with virtual reprocessing is effectively neutral in terms of the total amount of radioactive material or waste that will be present in the UK, given the very small quantities involved when compared to the large UK nuclear programme. (Although in a small number of cases commercial settlements may be reached without the return of products or waste);
- The amount of overseas-origin fuel that the NDA expects to manage through interim storage with virtual reprocessing is very small compared with the amounts of spent fuel that the NDA owns, manages and may potentially dispose of to a GDF;
- Extending current facilities (such as THORP) beyond their expected lifetimes, building new facilities or sending these materials overseas for processing would be an inefficient use of resources and divert resources from the NDA's clean-up and decommissioning programme; and
- These overseas-origin fuels are similar to other oxide fuels owned by the NDA and it is expected that they can be stored and disposed of in much the same way.

¹⁴ <http://www.nda.gov.uk/news/dsrl-exotics-preferred-option.cfm>

42. Providing the NDA with our agreement to interim store, pending disposal as a way for dealing with the remaining overseas origin spent fuels should not be taken to mean that none of these fuels will be processed. Whether the fuels will be reprocessed as originally expected or interim stored with virtual reprocessing will be decided by the NDA on a case-by-case basis using a standard business case approach. The NDA will still need to seek settlement with customers (in some cases)¹⁵, ensure the physical and technical capability to implement interim storage is feasible and through its site licence companies seek regulatory approval for implementation of the option.
43. Before we reach our conclusion on whether or not to approve the NDA's request, views are sought from non-governmental organisations, industry, representative bodies, individuals and other interested parties.

¹⁵ A necessary requirement of implementing interim storage is that the title of the overseas-origin fuels sits with the NDA. While this is already the case for the majority of the remaining overseas origin spent fuel, for some small amounts of fuel the NDA will have to obtain the agreement of the relevant overseas customers to transfer title to them.

Consultation questions

Consultation Question

- | | |
|----|--|
| 1. | Are there any possible consequences of this proposal which the Government might not have anticipated? |
|----|--|

Consultation Question

- | | |
|----|---|
| 2. | Are there any significant factors that we may have overlooked or under / over estimated that would influence our decision on the NDA's proposal? |
|----|---|

Consultation Question

- | | |
|----|--|
| 3. | Are there any general comments that you would like to make? |
|----|--|

What happens next?

This consultation will close on the 28th May 2014. The Government will consider the responses to the consultation and then publish a Government response, setting out how it intends to proceed.

Glossary

Advance Allocation	Advance Allocation allows the NDA to take ownership to the customer's spent fuel and in return allocate to them from NDA's stocks the nuclear materials and wastes that would have been expected to be recovered from reprocessing the spent fuel, in advance of the actual reprocessing in THORP. Advance Allocation requires the NDA to reprocess the spent fuel at some point whereby the nuclear materials recovered and waste produced would go into NDA stocks. For further details see Appendix 1.
AGR	Advanced gas cooled reactor. There are 14 AGRs at seven power stations in the UK.
BNFL	British Nuclear Fuels Ltd, the previous owner and operator of Sellafield Ltd prior to the formation of NDA
DFR	Dounreay Fast Reactor
DMTR	Dounreay Materials Test Reactor
EDF Energy	The company that owns and operates the AGR power stations in the UK
Exotics	The NDA manages a smaller inventory of non-standard fuels, commonly referred to as 'exotics' which are a legacy from earlier nuclear industry activities such as the development of research, experimental or prototype reactors
GDF	Geological Disposal Facility, a facility for the disposal of intermediate and high level wastes including spent fuel.
HLW	High Level Waste, being ILW but of such high radioactivity content as to be self-heating
ILW	Intermediate Level Waste. Which is defined as radioactive waste which does not generate much heat but which has radioactivity levels above the upper boundaries for low level waste (LLW) (4 Gigabecquerel per tonne alpha activity or 12 Gigabecquerel per tonne beta/gamma activity)
LLW	Low Level Waste. This is defined as 'radioactive waste having a radioactive content not exceeding 4 GBq/te of alpha or 12

	GBq/te of beta/gamma activity’.
LWR	Light Water Reactor (comprising PWR (pressurised water reactor) and BWR (boiling water reactor designs)
Magnox	Refers to the reprocessing plant at Sellafield which reprocesses spent fuel from the UK’s first generation (“Magnox”) nuclear reactors.
MOX	Mixed oxide fuel, comprising plutonium and uranium oxides
NDA	The Nuclear Decommissioning Authority
PFR	Prototype Fast Reactor
PWR	Pressurised water reactor. Sizewell B is a PWR
RWMD	Radioactive Waste Management Directorate
SL	Sellafield Limited
SF	Spent fuel
THORP	Thermal Oxide Reprocessing Plant – a chemical plant owned by NDA and operated by Sellafield Ltd for the reprocessing of oxide spent fuels from AGRs and LWRs
UKAEA	United Kingdom Atomic Energy Authority
tHM	tonnes heavy metal (mostly uranium plus plutonium) prior to irradiation
Virtual reprocessing	Virtual reprocessing means swapping overseas-origin spent fuel for UK nuclear materials and waste without subsequently reprocessing the spent fuel.

Appendix 1

A summary of the remaining spent fuels that came from overseas

The THORP Contracts

1. In 2012 the NDA completed a strategic review of its options for THORP and the management of its oxide spent fuels and those that it holds under contracts with its customers. This review concluded that the delivery of the current strategy – to reprocess the contracted amount of spent fuel in THORP – remains the most viable and cost-effective option. This strategy would mean THORP would cease reprocessing operations in late 2018 as operation of THORP beyond this point is not expected to be economic¹⁶.
2. In their oxide fuel strategy paper the NDA explained that there remain a number of performance risks that could impact on the delivery of the strategy, and that in some scenarios operational difficulties could result in the reprocessing of less than the currently planned amount of spent fuel. The paper also highlighted that to close out the reprocessing contracts and complete the reprocessing programme in THORP would require some flexibility around some of the current arrangements.
3. Only about 300 tonnes of the overseas-origin spent fuel remains to be reprocessed in THORP. This means that THORP has completed nearly 95% of its overseas' order book. It is also the case that the majority of this remaining 300 tonnes of overseas origin spent fuel has been advance allocated.
4. Within this remaining 300 tonnes are small amounts of prototype fuels, experimental fuels, mixed oxide fuels and some materials leftover from research programmes to substantiate the in-reactor performance of irradiated fuels, amounting to about 28 tonnes.

The Dounreay Contracts

5. The Dounreay nuclear site was originally constructed by the UKAEA in the 1950's as a research reactor site for fast reactors and materials testing. Over the period of operation three reactors were built on the site, a materials test reactor (DMTR) and two fast reactors (DFR and PFR). To support these reactors a suite of plants were built to carry out fuel fabrication, reprocessing and uranium conversion, along with the ancillary support facilities such as laboratory analysis and waste management.
6. The processing and reprocessing plants had the capacity to process more fuel than just that arising from the Dounreay reactor programmes and in the 1980s the UKAEA-owned site

¹⁶ See NDA papers on the Oxide Fuel Strategy: <http://www.nda.gov.uk/documents/upload/Oxide-Fuels-Preferred-Options-June-2012.pdf> and <http://www.nda.gov.uk/documents/upload/Oxide-Fuels-Credible-Options-November-2011.pdf>

started to undertake contracts on a commercial basis to utilise the extra capacity in these plants. Many of these contracts were for the reprocessing of experimental or prototype fuels (such as MOX) from overseas reactors and for the recovery of uranium and plutonium-bearing manufacturing scraps.

7. In 1996 the dissolver failed in the plutonium reprocessing plant at Dounreay and shortly thereafter the Government decided to suspend operations to replace the dissolver. In effect, this meant that it was not possible to complete any of the outstanding contracts that were dependent on this plant. In 1998 fuel processing operations at Dounreay were indefinitely suspended by the UKAEA, effectively preventing the completion of any contracts that were outstanding at the time.
8. At the time of closure 2.1 tHM of overseas customer material remained at Dounreay. The permanent closure of the plants at Dounreay left sixteen outstanding overseas contracts for spent fuels and nuclear materials management with no facility available to complete them. In the late 1990's the UKAEA's commercial team pursued the settlement of a number of these contracts and eventually with Government approval a series of 'Advanced Allocation' arrangements were put in place for thirteen of the sixteen outstanding Dounreay contracts. This allowed some contracts to be closed out with products and wastes, that would have arisen at Dounreay had the contracts been completed, allocated to the customers.
9. To achieve this, the UK took title to 1.6 tHM of customer-owned spent fuels and nuclear materials held at Dounreay with the intention of contracting the processing of these materials, together with similar Dounreay owned materials, with other facilities at a later date. At the time of agreeing these Advance Allocation agreements, facilities to process these materials were expected to become available. However subsequent attempts to identify suitable facilities required to complete these contracts have failed meaning that an alternative solution is needed to manage these materials.
10. Three of the sixteen contracts, comprising ~0.46 tHM, remain unsettled. The customers for these contracts were not prepared to close out the contracts on an advanced allocation basis.
11. After the NDA was formed, it assumed, from the UKAEA, the rights and liabilities relating to the advanced allocated fuels and the outstanding contracts covering these 2.1 tHM of overseas-origin materials by virtue of a Nuclear Transfer Scheme although there were no facilities to complete the contracts at Dounreay.
12. The NDA strategy for the clean-up and decommissioning of Dounreay requires the transfer of the materials covered under these sixteen contracts to Sellafield for management where they will be stored, safely and securely, alongside similar materials in the appropriate storage facilities at this site. To support this strategy the NDA is seeking to reach a settlement with customers on the three outstanding contracts and to agree with Government a means of managing these fuels and materials, given that they cannot be reprocessed.

Note on Advance Allocation

13. In 2007, to counter the effect of delays to reprocessing and to make products and wastes available to customers on earlier timescales, the NDA were permitted to use Advance Allocation¹⁷. Advance Allocation allowed the NDA to take ownership to the customer's spent fuel and in return allocate to them from NDA stocks the nuclear materials and wastes that would have been expected to be recovered from reprocessing the spent fuel, in advance of the actual reprocessing in THORP. Advance Allocation requires the NDA to reprocess the spent fuel at some point whereby the nuclear materials recovered and waste produced would go into NDA stocks.
14. Advance Allocation was agreed following a Public Consultation in 2007 and did not change Government policy on THORP, which remains as "THORP will continue to operate until existing contracts are complete or the plant is no longer economic"¹⁸.
15. At the time the Government agreed to the practice of Advance Allocation we made it clear that if for some reason these fuels could not be reprocessed in THORP then we would consult publicly before a decision was taken to implement alternative options. This is because the practice of swapping spent fuel for nuclear materials and waste without subsequently reprocessing the spent fuel is not Advance Allocation but more accurately described as "virtual reprocessing". Neither process was envisaged when the original contracts were signed and when the policy on radioactive waste management (CM 2919) was drawn up. It was for this reason Government decided to consult on Advance Allocation and why we said we would consult again before agreeing that such fuel did not have to be reprocessed.

¹⁷ <http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/files/file39759.pdf>;
<http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/files/file42361.pdf>

¹⁸ "Government policy is to keep THORP open until the overseas contracts have been completed. This was set out the 2002 Managing the Nuclear Legacy White Paper.
<http://webarchive.nationalarchives.gov.uk/+http://www.dti.gov.uk/nuclearcleanup/ach/whitepaper.pdf> Advance Allocation will have no impact on this policy as the spent fuel will continue to be reprocessed in THORP....In the unlikely event that THORP was closed permanently, we would at that stage consider; transferring the spent fuel to another reprocessor for reprocessing; retaining the spent fuel in the UK. Any decision would be subject to the outcome of a separate public consultation."

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